RF TEST REPORT

Test item	:	Cellular/PCS GSM/GPRS/EDGE and Cellular/PCS WCDMA/HSPA Phone with Bluetooth and WLAN
Model No.	:	LG-P768g, LG-P768G, LGP768g, LGP768G, P769g, P769G
Order No.	:	DEMC1207-01176
Date of receipt	:	2012-07-13
Test duration	:	2012-07-27 ~ 2012-08-31
Date of issue	:	2012-09-11
Use of report	:	FCC Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : Digital EMC Co., Ltd.

683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification	:	FCC Part 15.407 Subpart E
		ANSI C63.4-2003, KDB 789033
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:	Witnessed by:	Reviewed by:
Engineer S.K.RYU	N/A	Technical Director Harvey sung

CONTENTS

1. EUT information

1.1 EUT description

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Cellular/PCS GSM/GPRS/EDGE and Cellular/PCS WCDMA/HSPA Phone with Bluetooth and WLAN
Model Name	LG-P768g
Add Model Name	LG-P768G, LGP768g, LGP768G, P769g, P769G
Equipment serial no.	Identical prototype
Frequency Range	802.11a/n(20MHz) : Band I: 5180 ~ 5240MHz Band II: 5260 ~ 5320MHz Band III: 5500 ~ 5700MHz
Channel number	802.11a/n(20MHz): 4 (Band I) / 4 (Band II) / 8 (Band III)
Modulation type	802.11a/n : OFDM
Data rate	802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n(20MHz): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps
Antenna Specification	Internal Antenna (1TX / 1RX) / Max. peak gain: -0.63dBi
Power Supply	DC 3.8 V

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2. Information about test items

2.1 Test mode / Channel Information

5GHz Band	Mode	Data Rate
Band I	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	-
Band II	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	-
Band III	802.11a	6Mbps
	802.11n(20MHz)	MCS0
	802.11n(40MHz)	-

For all test items, the low, middle and high channels of the modes were tested with above worst case data rate.

2.2 Tested Channel Information

5GHz Band	802.11a/n(20MHz)		802.11n(40MHz)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]
Band I	36	5180	-	-
	40	5200	-	-
	48	5240	-	-
Band II	52	5260	-	-
	60	5300	-	-
	64	5320	-	-
Band III	100	5500	-	-
	116	5580	-	-
	140	5700	-	-

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.4 Tested environment

Temperature	:	24 ~ 25 ^{o}C
Relative humidity content	:	45 ~ 54 % R.H.
Details of power supply	:	DC 3.8 V

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
  → None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.407(a)	N/A	26 dB Bandwidth for FCC	N/A	Conducted	C
15.407(a)	RSS-210 [A9.2]	Maximum Conducted Output Power	$< 4 + 10\log_{10}(B)$ dBm (5150-5250) $< 11 + 10\log_{10}(B)$ dBm (5250-5350) $< 11 + 10\log_{10}(B)$ dBm (5470-5725)		C
15.407(a)	RSS-210 [A9.2]	Peak Power Spectral Density	< 4 dBm/MHz (5150-5250) < 11 dBm/MHz (5250-5350) < 11 dBm/MHz (5470-5725)		C
15.407(a)	N/A	Peak Excursion	< 13 dB/MHz maximum difference		C
15.407(g)	N/A	Frequency Stability	N/A		C
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	N/A		NA
15.407(b)	RSS-210 [A9.2]	Undesirable Emissions	< -27 dBm/MHz EIRP (5150-5725)	Radiated	C
15.205 15.209 15.407(b)	RSS-Gen [7.2.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS Test Report		C Note3
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	RSS-Gen [7.1.2]	Antenna Requirements	FCC 15.203	-	C

Note 1: **C**=Comply   **NC**=Not Comply   **NT**=Not Tested   **NA**=Not Applicable

Note 2: These test items were performed in each axis and the worst case data was reported.

Note 3: Refer to the DFS Test Report.

3.2 Transmitter requirements

3.2.1 26 dB Bandwidth

Test Requirements

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The 26dB bandwidth is used to determine the conducted output power limit.

▣ **TEST CONFIGURATION**
Refer to the APPENDIX I.

▣ **TEST PROCEDURE**
The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033**.

1. Set resolution bandwidth (RBW) = approximately **1 %** of the EBW.
2. Set the video bandwidth **(VBW) > RBW**.
3. Detector = **Peak**.
4. Trace mode = **max hold**.
   Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

▣ **TEST RESULTS: Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band I	36	5180	18.607
		40	5200	18.677
		48	5240	18.632
	Band II	52	5260	18.658
		60	5300	18.540
		64	5320	18.551
	Band III	100	5500	18.592
		116	5580	18.543
		140	5700	18.547
802.11n (20MHz)	Band I	36	5180	18.821
		40	5200	18.926
		48	5240	18.979
	Band II	52	5260	18.871
		60	5300	19.078
		64	5320	18.909
	Band III	100	5500	19.013
		116	5580	18.919
		140	5700	19.000

�◩ **RESULT PLOTS**

26 dB Bandwidth   Test Mode: 802.11a & Ch.36
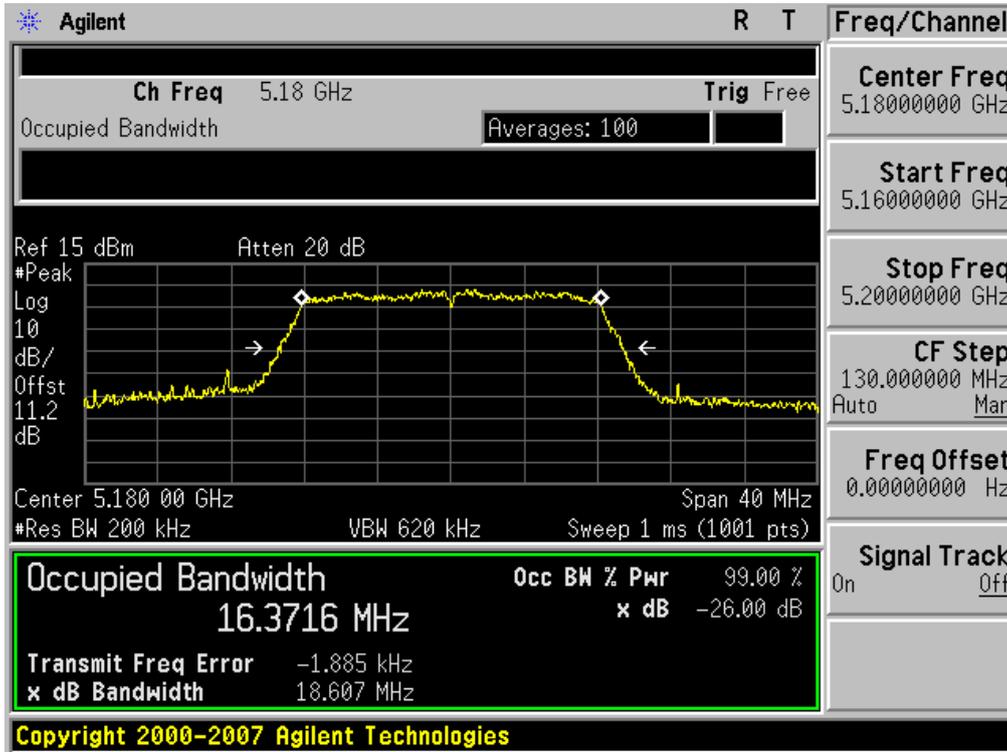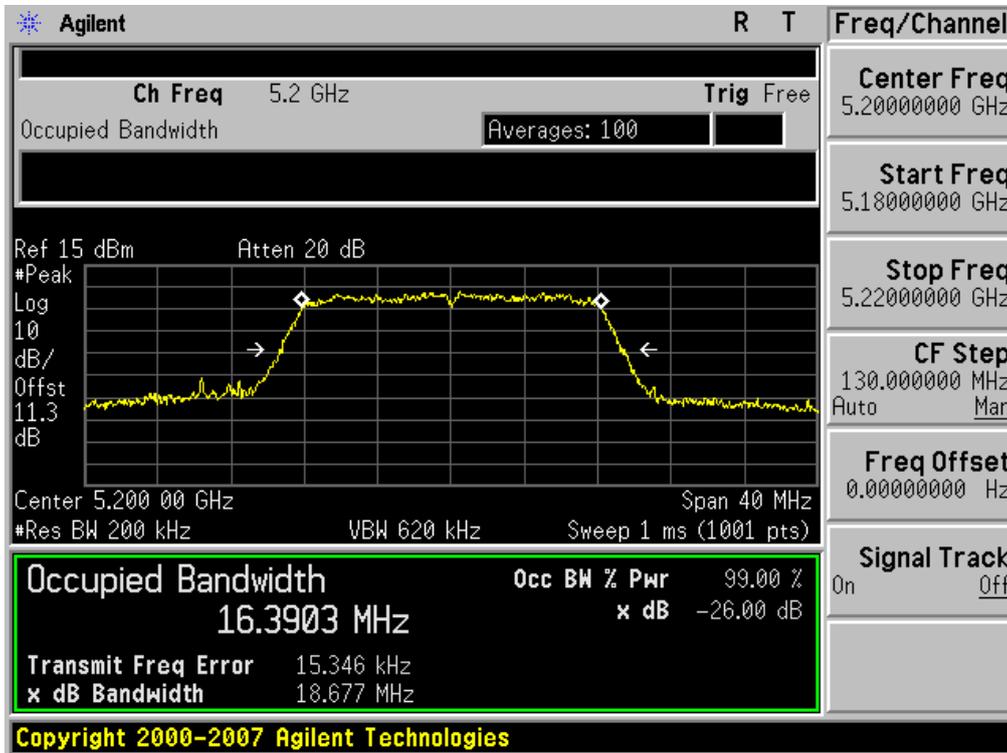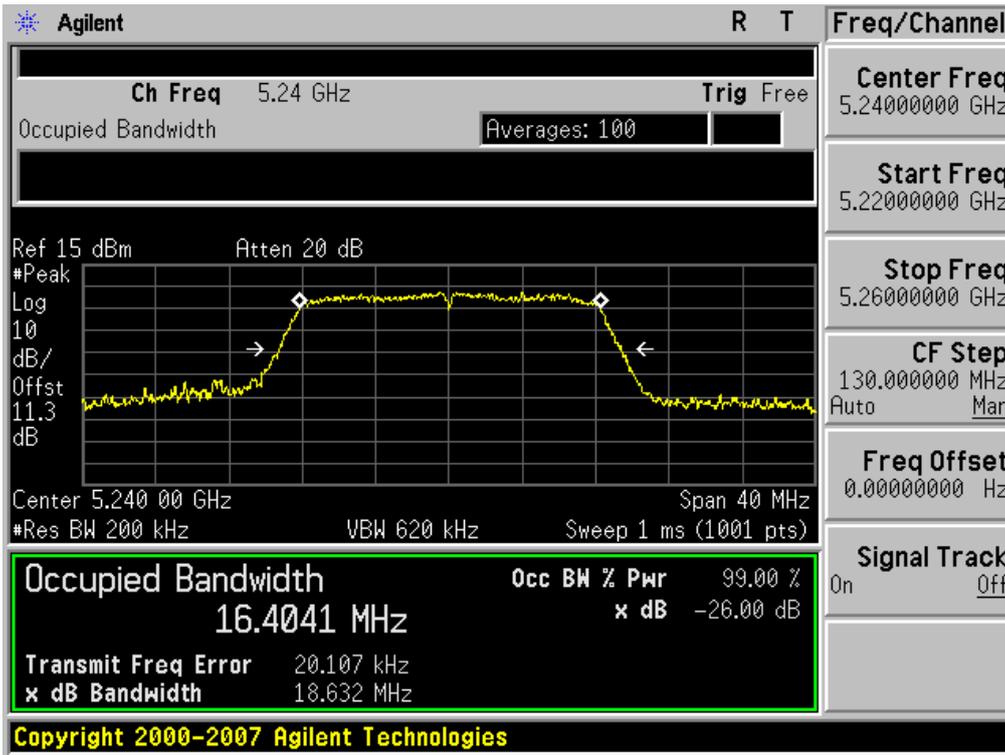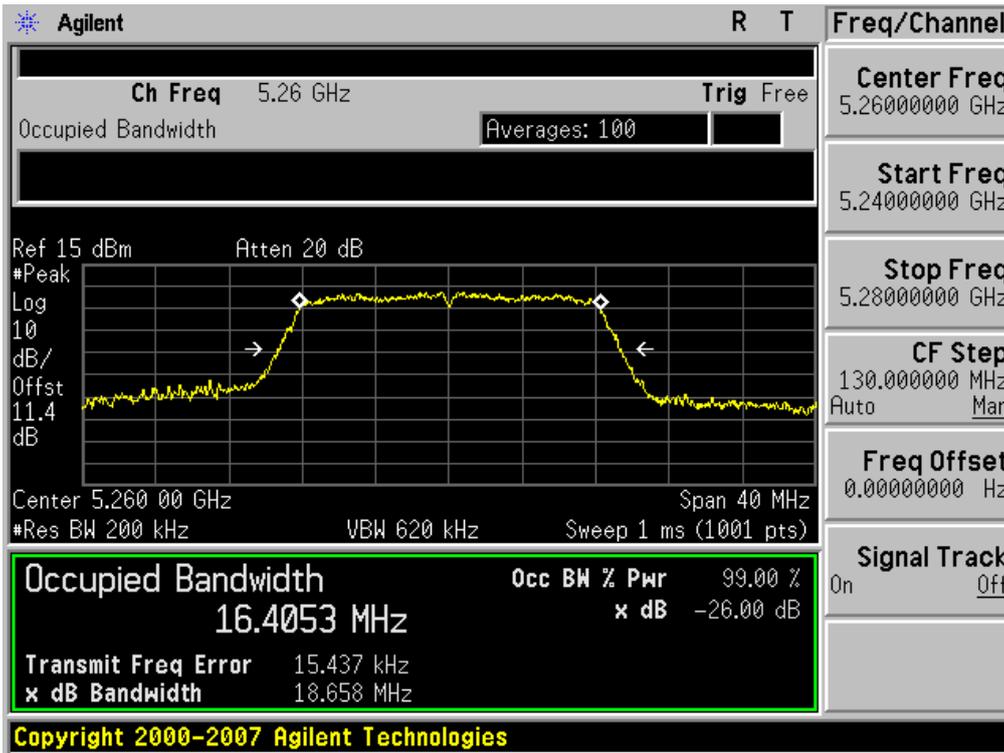

26 dB Bandwidth   Test Mode: 802.11a & Ch.40

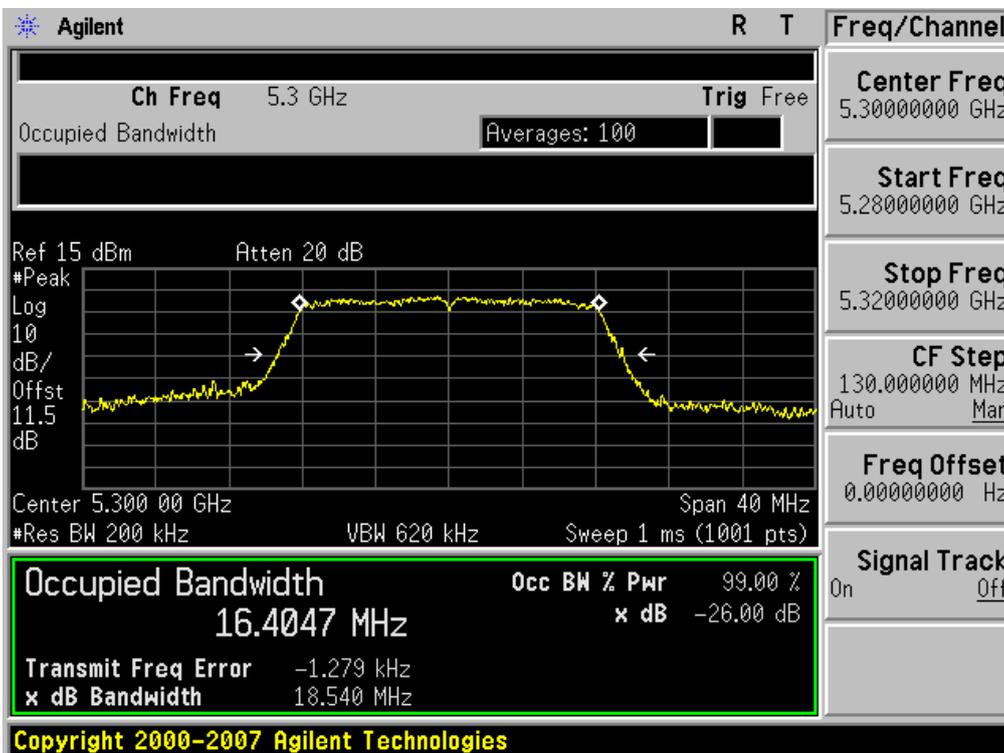**26 dB Bandwidth**   Test Mode: 802.11a & Ch.48

```
※ Agilent                                          R   T  │ Freq/Channel
┌──────────────────────────────────────────────┐  ┌─────────────
│        Ch Freq   5.24 GHz            Trig Free │  │ Center Freq
│  Occupied Bandwidth        │Averages: 100│     │  │ 5.24000000 GHz
├──────────────────────────────────────────────┤  ├─────────────
│                                                │  │ Start Freq
│ Ref 15 dBm       Atten 20 dB                   │  │ 5.22000000 GHz
│ #Peak                                          │  ├─────────────
│ Log    ◇──────────────────◇                    │  │ Stop Freq
│ 10                                             │  │ 5.26000000 GHz
│ dB/       →                      ←             │  ├─────────────
│ Offst                                          │  │ CF Step
│ 11.3                                           │  │ 130.000000 MHz
│ dB                                             │  │ Auto      Man
│ Center 5.240 00 GHz              Span 40 MHz   │  ├─────────────
│ #Res BW 200 kHz    VBW 620 kHz  Sweep 1 ms (1001 pts) │ Freq Offset
├──────────────────────────────────────────────┤  │ 0.00000000 Hz
│ Occupied Bandwidth      Occ BW % Pwr   99.00 % │  ├─────────────
│        16.4041 MHz       x dB   −26.00 dB      │  │ Signal Track
│ Transmit Freq Error  20.107 kHz                │  │ On       Off
│ x dB Bandwidth       18.632 MHz                │  │
├──────────────────────────────────────────────┤  │
│ Copyright 2000-2007 Agilent Technologies       │  │
└──────────────────────────────────────────────┘
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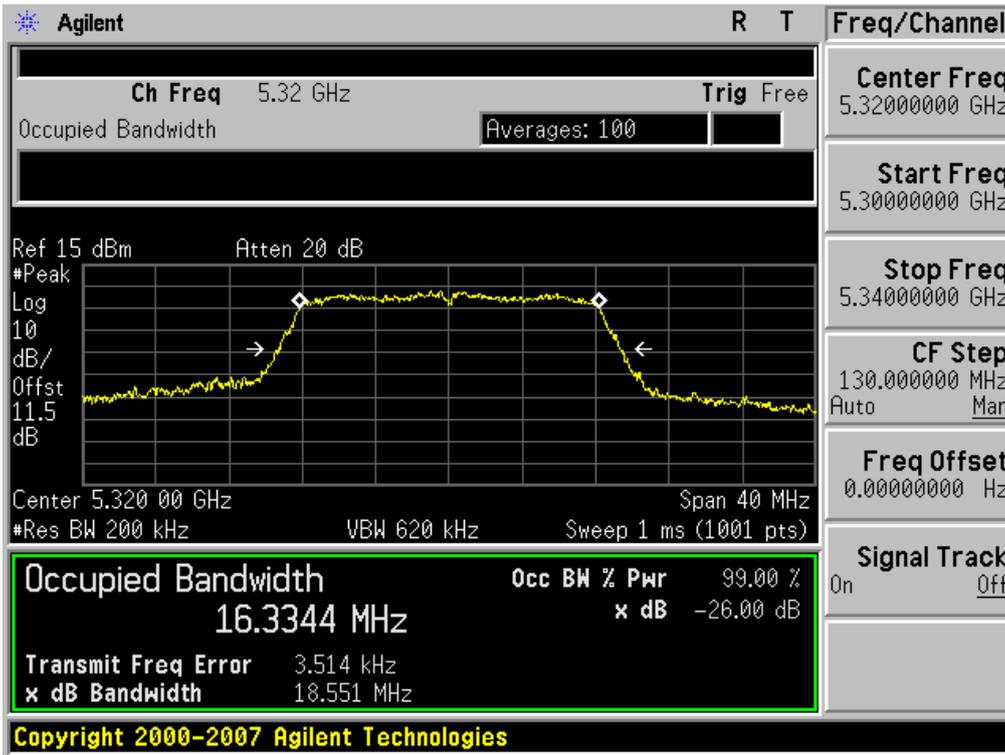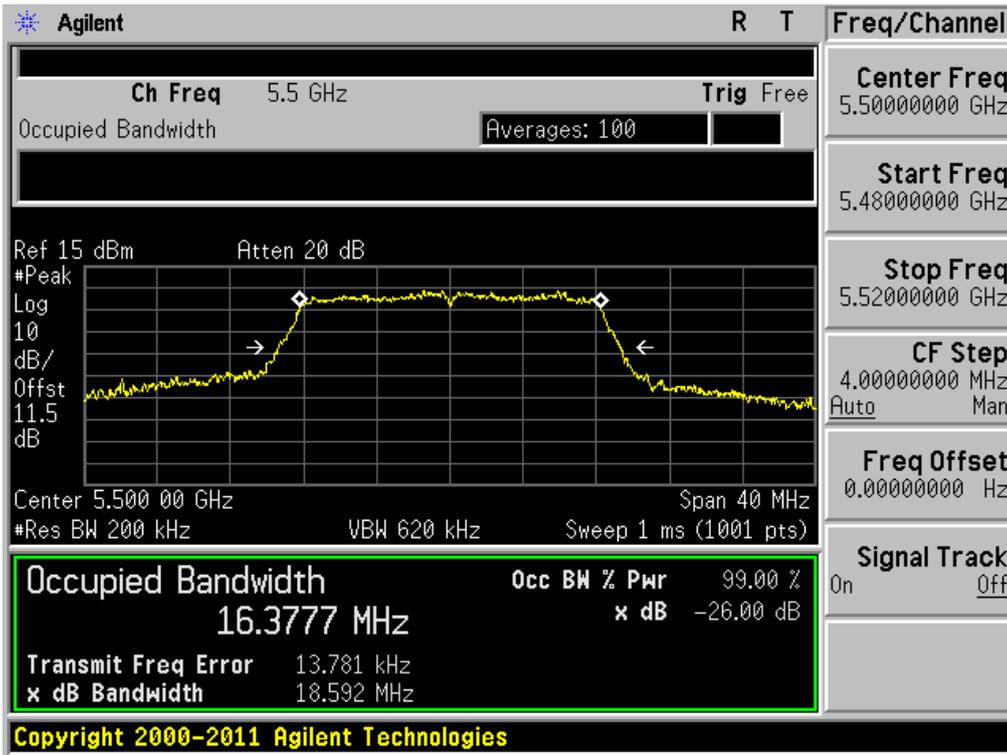**26 dB Bandwidth**   Test Mode: 802.11a   &   Ch.52

26 dB Bandwidth   Test Mode: 802.11a   &   Ch.60

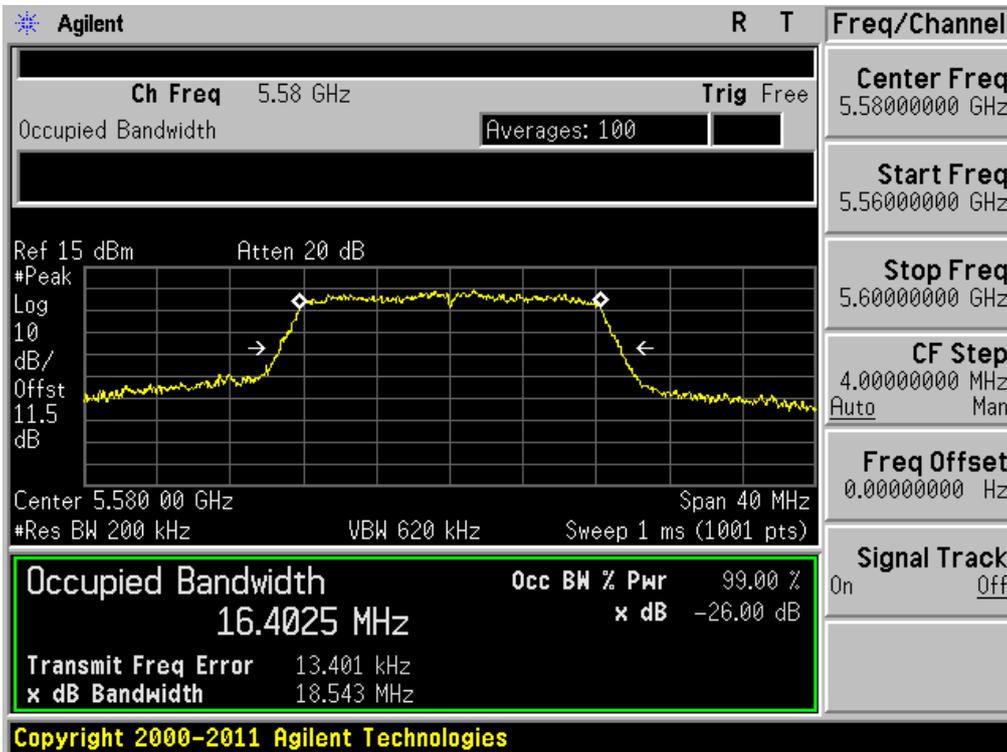**26 dB Bandwidth**   Test Mode: 802.11a   &   Ch.64

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26 dB Bandwidth   Test Mode: 802.11a   &   Ch.100

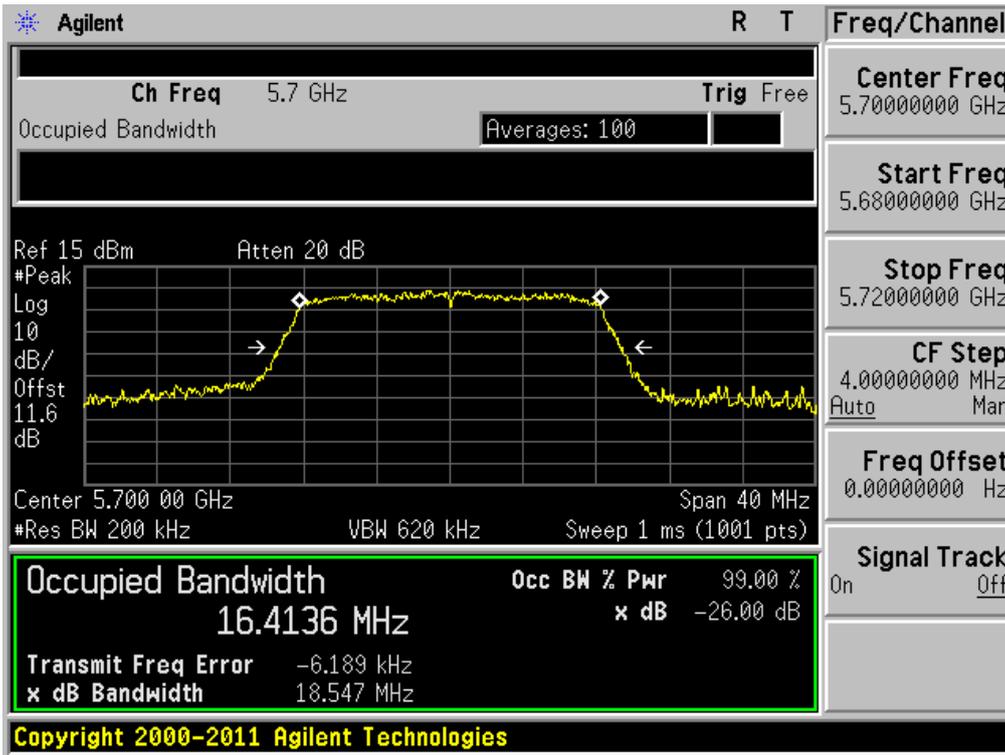**26 dB Bandwidth**   Test Mode: 802.11a   &   Ch.116
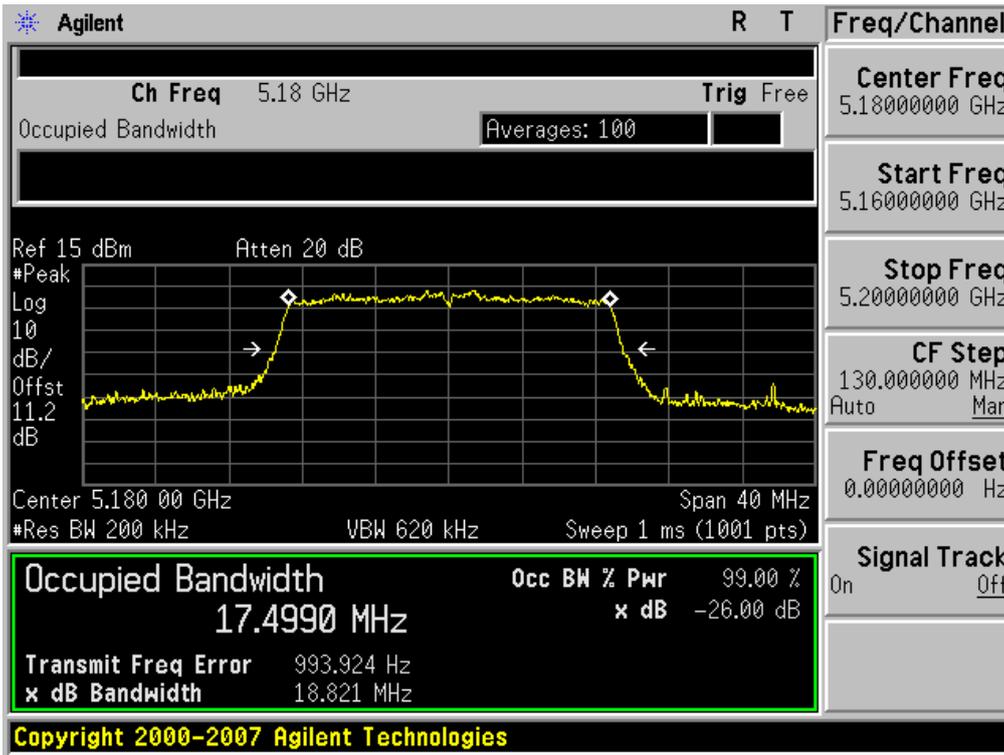
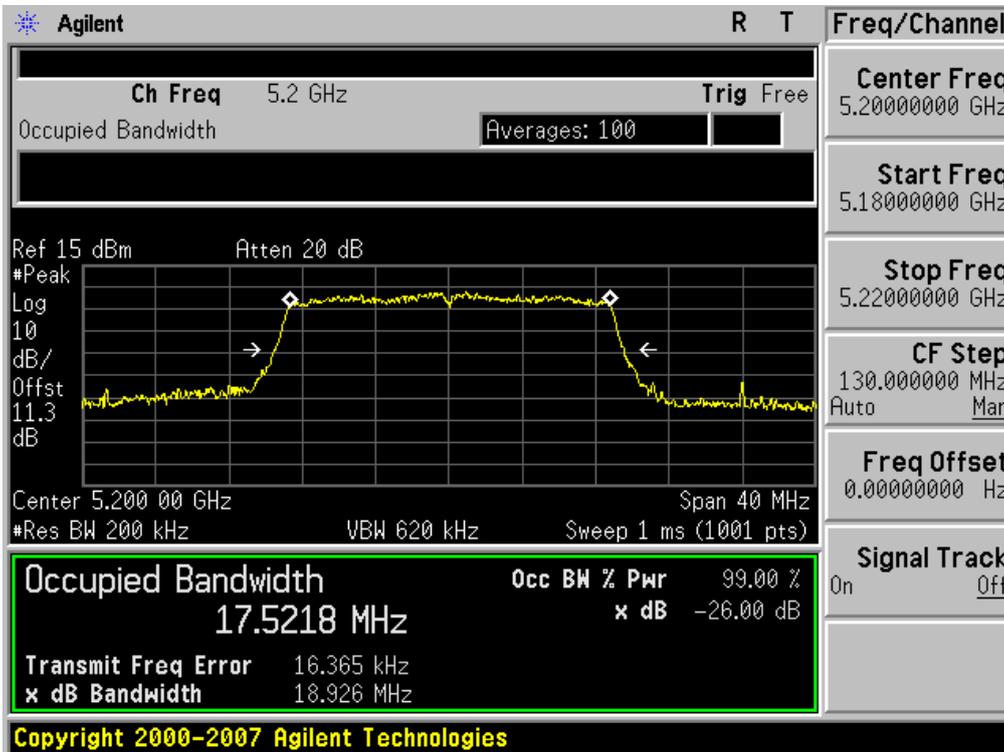**26 dB Bandwidth**   Test Mode: 802.11a   &   Ch.140

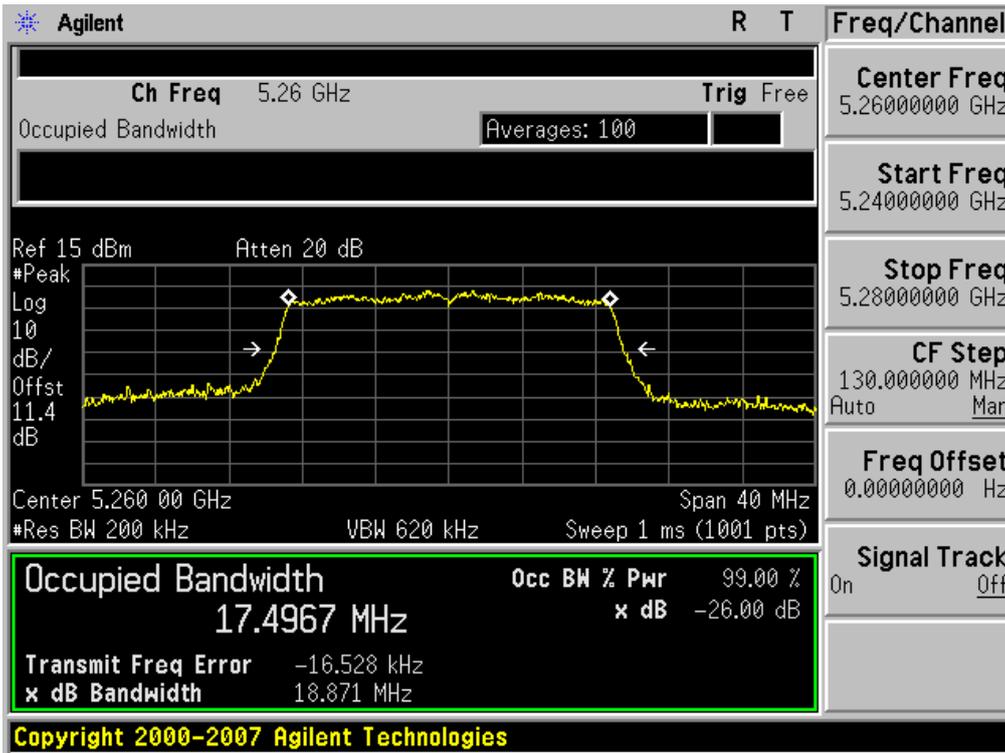**26 dB Bandwidth**   Test Mode: 802.11n-HT20 & Ch.36

26 dB Bandwidth   Test Mode: 802.11n-HT20 & Ch.40

26 dB Bandwidth   Test Mode: 802.11n-HT20 & Ch.48

```
  ✳ Agilent                                         R  T │ Freq/Channel
                                                          │ ┌──────────────┐
                                                          │ │ Center Freq  │
        Ch Freq   5.24 GHz                    Trig Free   │ │ 5.24000000 GHz│
  Occupied Bandwidth              │Averages: 100│         │ └──────────────┘
                                                          │ ┌──────────────┐
                                                          │ │  Start Freq  │
  Ref 15 dBm          Atten 20 dB                         │ │ 5.22000000 GHz│
  #Peak                                                   │ └──────────────┘
  Log                                                     │ ┌──────────────┐
  10                                                      │ │  Stop Freq   │
  dB/                                                     │ │ 5.26000000 GHz│
  Offst                                                   │ └──────────────┘
  11.3                                                    │ ┌──────────────┐
  dB                                                      │ │   CF Step    │
                                                          │ │130.000000 MHz│
  Center 5.240 00 GHz               Span 40 MHz           │ │Auto      Man │
  #Res BW 200 kHz     VBW 620 kHz   Sweep 1 ms (1001 pts) │ └──────────────┘
  ┌──────────────────────────────────────────────────┐   │ ┌──────────────┐
  │ Occupied Bandwidth      Occ BW % Pwr    99.00 %   │   │ │  Freq Offset │
  │          17.4835 MHz     x dB    -26.00 dB        │   │ │0.00000000  Hz│
  │ Transmit Freq Error   16.521 kHz                  │   │ └──────────────┘
  │ x dB Bandwidth        18.979 MHz                  │   │ ┌──────────────┐
  └──────────────────────────────────────────────────┘   │ │ Signal Track │
  Copyright 2000-2007 Agilent Technologies                │ │On        Off │
                                                          │ └──────────────┘
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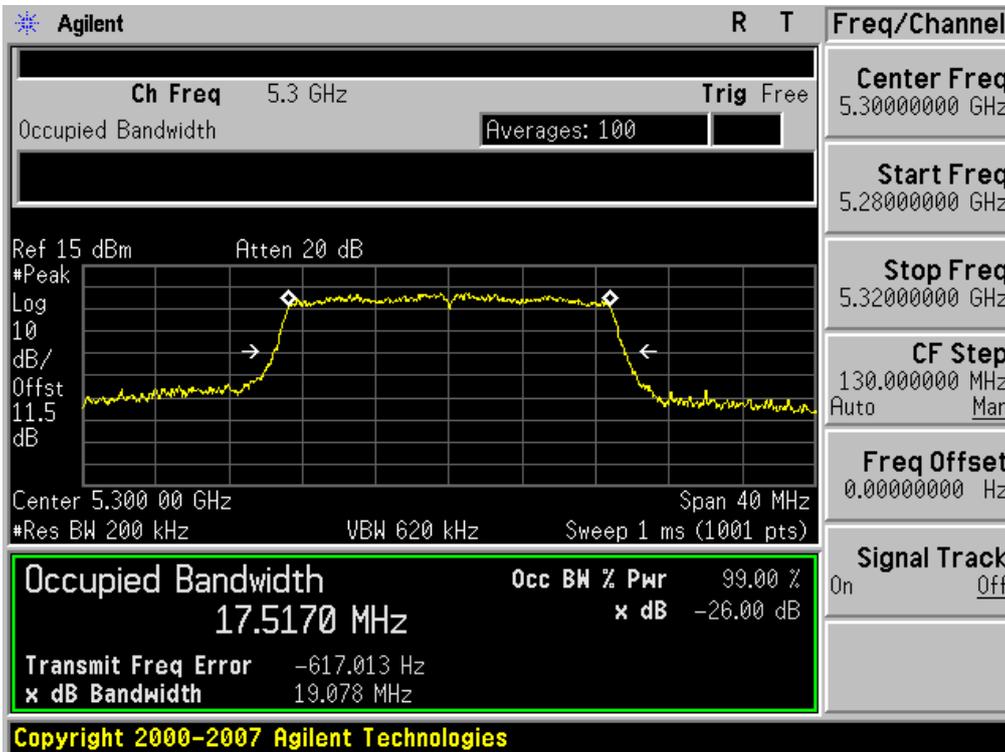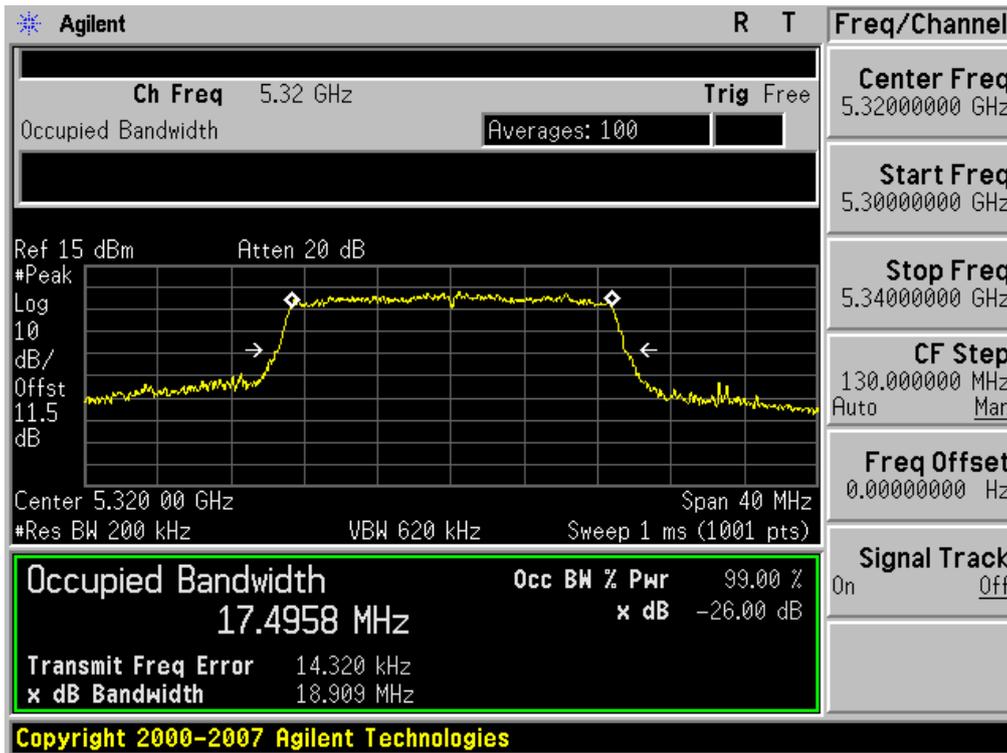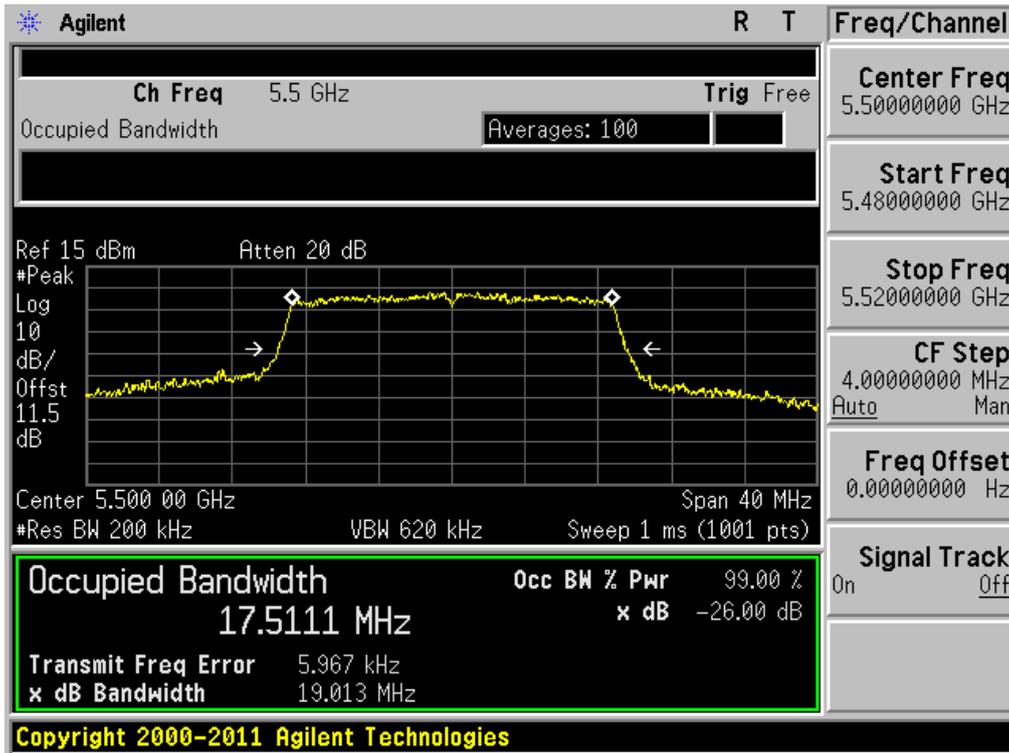**26 dB Bandwidth**   Test Mode: 802.11n-HT20 & Ch.52

26 dB Bandwidth   Test Mode: 802.11n-HT20 & Ch.60

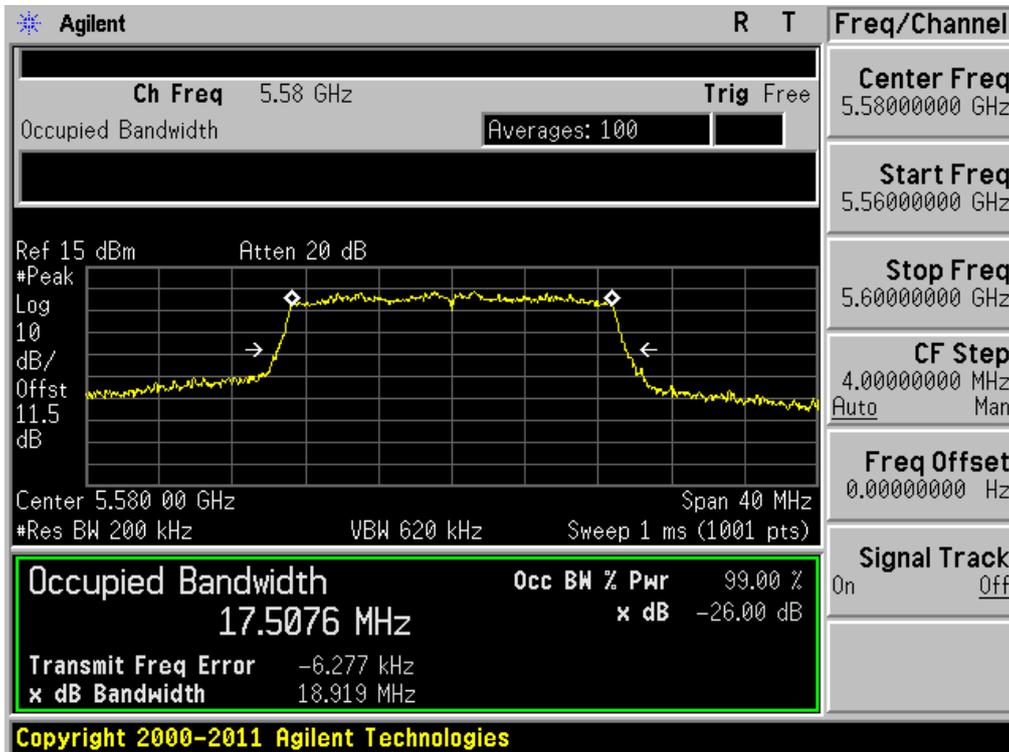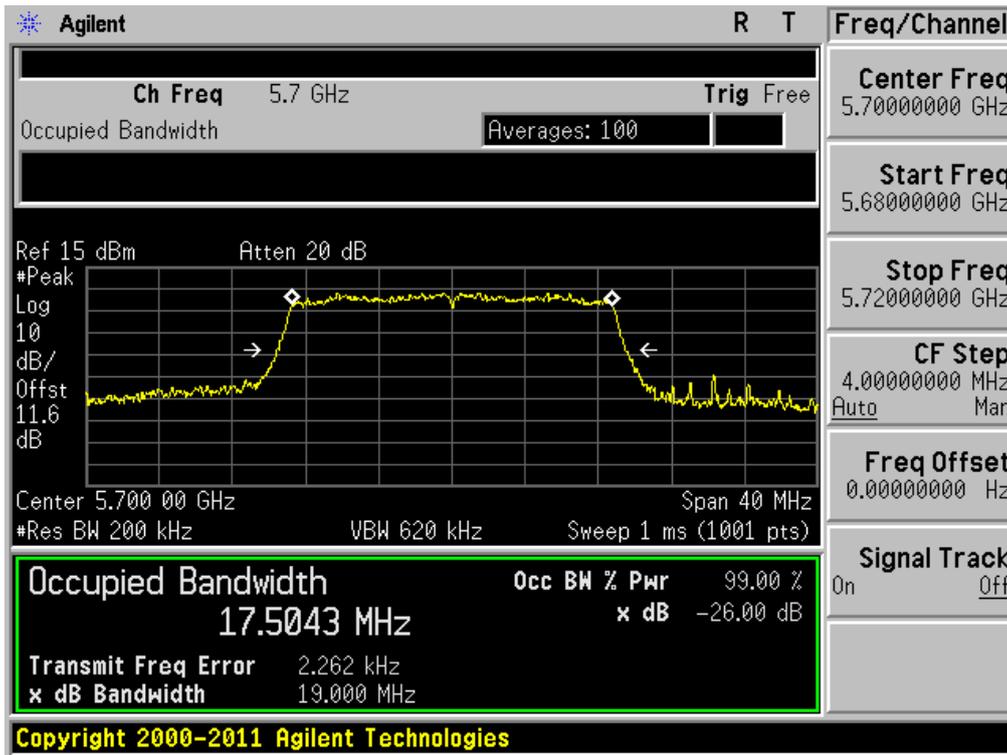**26 dB Bandwidth**   Test Mode: 802.11n-HT20 & Ch.64

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26 dB Bandwidth   Test Mode: 802.11n-HT20 & Ch.100

26 dB Bandwidth   Test Mode: 802.11n-HT20 & Ch.116

26 dB Bandwidth   Test Mode: 802.11n-HT20   &   Ch.140

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3.2.2 Output Power

Test Requirements

(1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation
shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output
power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the
antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency
bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission
bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the
maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB
that the directional gain of the antenna exceeds 6 dBi.

- Output power Limit Calculation

Bands	Mode	Power Limit [mW] / Least 26dBC BW [MHz]	Calculated Limit [dBm]	ANT Gain	Determined Limit [dBm]
Band I	802.11a	50	16.98	-0.63	16.69
		18.607	**16.69**		
	802.11n HT20	50	16.98		16.74
		18.821	**16.74**		
	802.11n HT40	-	-		-
		-	-		

Bands	Mode	Power Limit [mW] / Least 26dBC BW [MHz]	Calculation Limit [dBm]	ANT Gain	Determined Limit [dBm]
Band II	802.11a	250	23.97	-0.63	23.68
		18.540	**23.68**		
	802.11n HT20	250	23.97		23.75
		18.871	**23.75**		
	802.11n HT40	-	-		-
		-	-		
Band III	802.11a	250	23.97	-0.63	23.68
		18.543	**23.68**		
	802.11n HT20	250	23.97		23.76
		18.919	**23.76**		
	802.11n HT40	-	-		-
		-	-		

▣ **TEST CONFIGURATION**
Refer to the APPENDIX I.

◉ **TEST PROCEDURE:**

Maximum Conducted Output Power is measured using Measurement Procedure **Method SA-2 of KDB789033**

1. Set the **RBW = 1 MHz**.
2. Set the **VBW ≥ 3 MHz**.
3. Set **SPAN to encompass the entire EBW** of signal.
4. Detector = **RMS (power averaging)**
5. Sweep time = **auto couple**.
6. **Trace average at least 100 traces in power averaging**.
7. **Compute power by integrating the spectrum across the 26 dB EBW** of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges.
8. **Add 10 log(1/x), where x is the duty cycle**, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission)

◉ **TEST RESULTS : Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11a	36	5180	10.00	2.06	2.16	0.95	0.23	10.23
	40	5200	9.90					10.13
	48	5240	9.72					9.95
	52	5260	9.73	2.06	2.16	0.95	0.23	9.96
	60	5300	9.48					9.71
	64	5320	9.62					9.85
	100	5500	10.88	2.06	2.16	0.95	0.23	11.11
	116	5580	10.04					10.27
	140	5700	10.61					10.84

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Result
				On Time[ms]	On+Off Time[ms]	X		
802.11n (20MHz)	36	5180	9.91	1.92	2.02	0.95	0.23	10.14
	40	5200	9.63					9.86
	48	5240	9.66					9.89
	52	5260	9.55	1.92	2.02	0.95	0.23	9.78
	60	5300	9.43					9.66
	64	5320	9.28					9.51
	100	5500	10.52	1.92	2.02	0.95	0.23	10.75
	116	5580	9.82					10.05
	140	5700	10.30					10.53

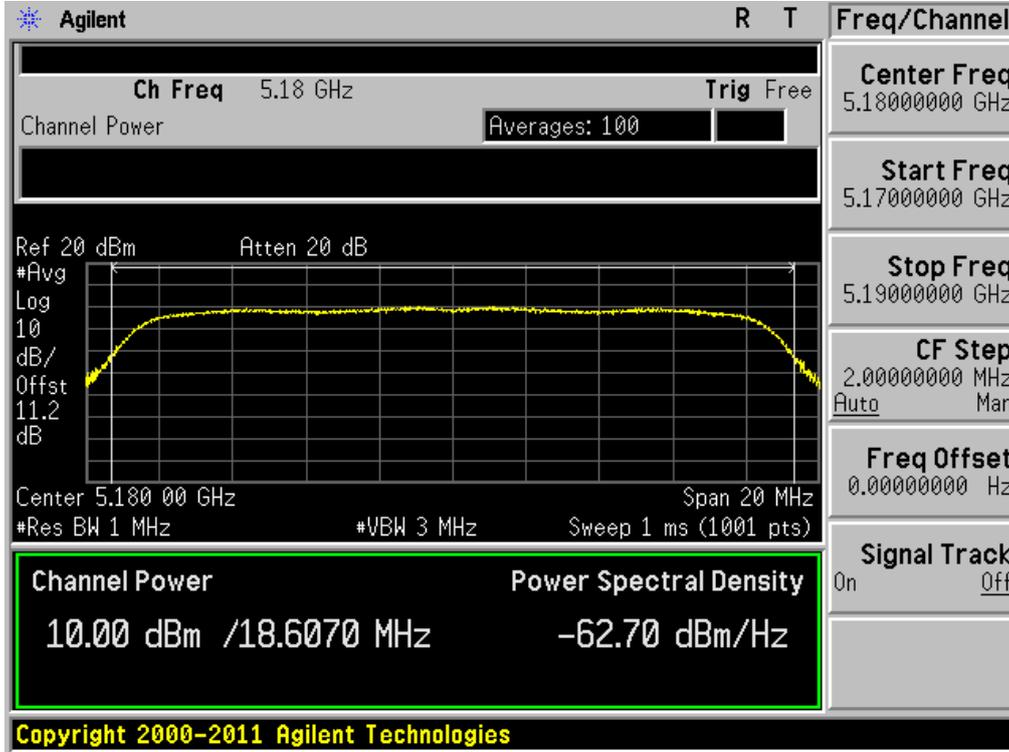Note 1 : DCF = 10log(1 / X),   X = On Time / (On+Off time)
Note 2 : Test Result = Measurement Data + DCF

◨ **Measurement Data PLOTS**

Output Power   Test Mode: 802.11a   &   Ch.36
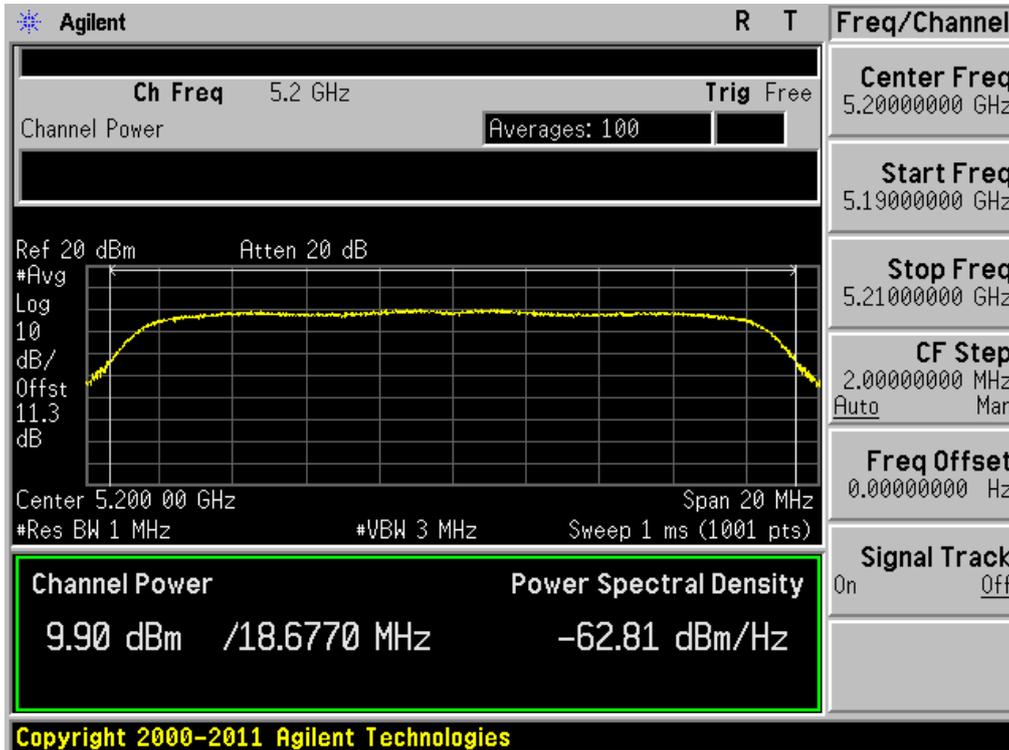

Output Power   Test Mode: 802.11a   &   Ch.40
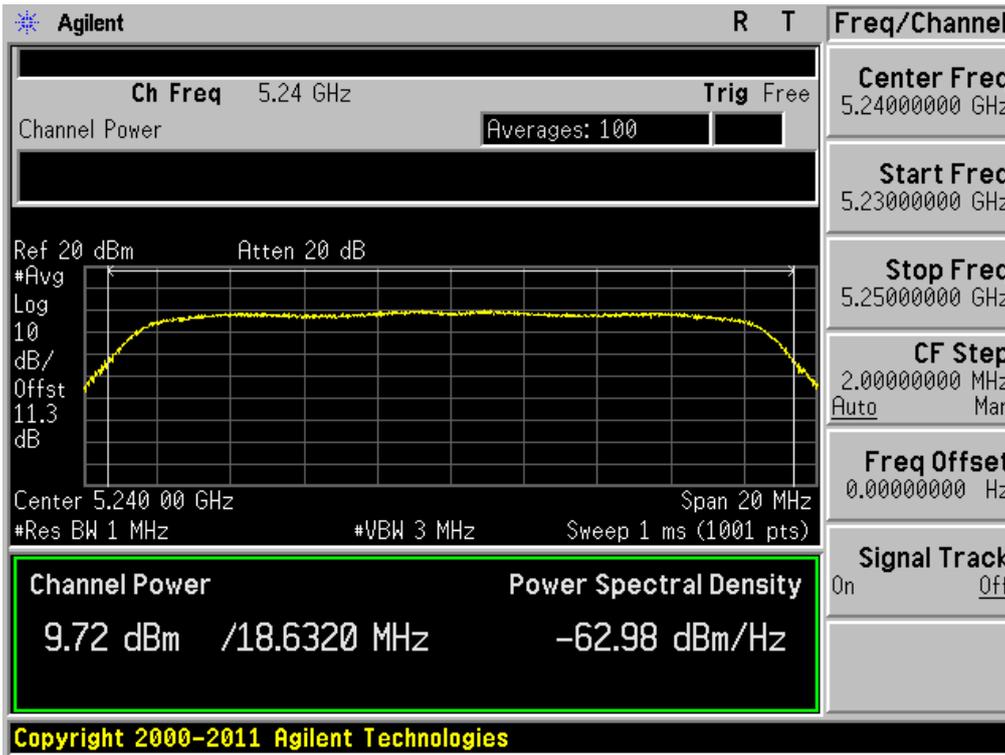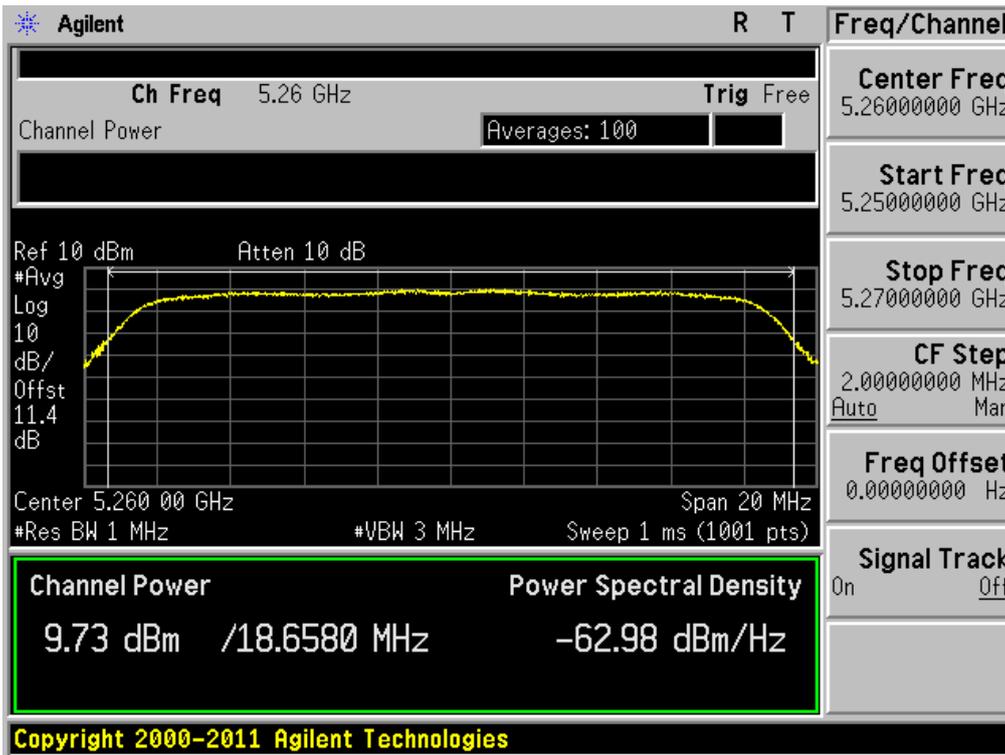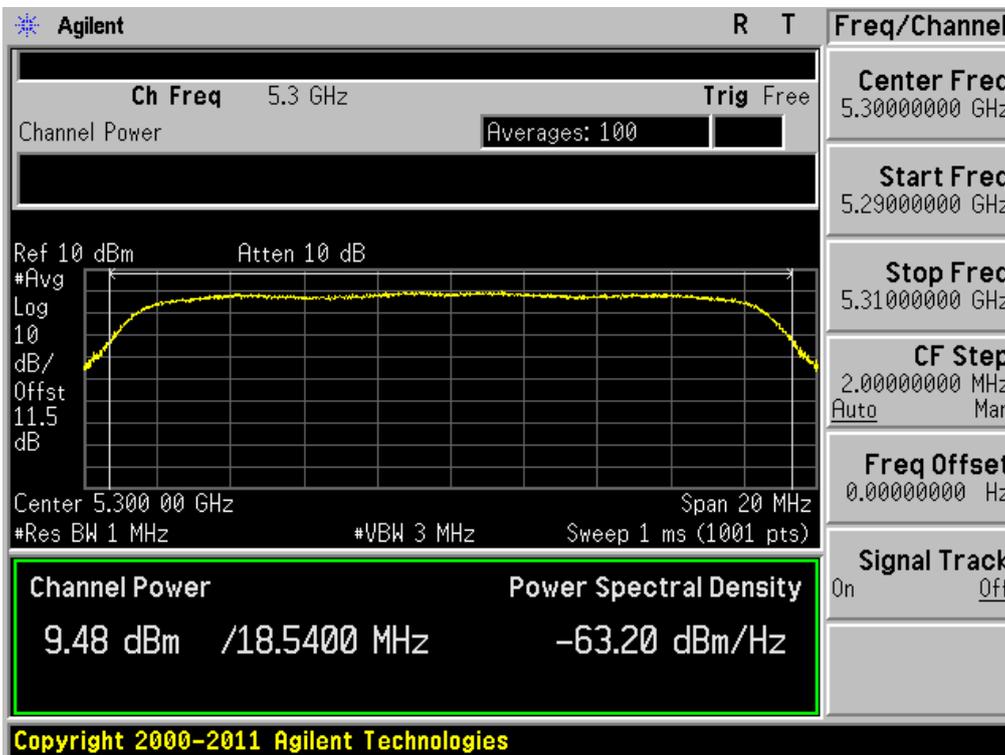
Output Power   Test Mode: 802.11a & Ch.48

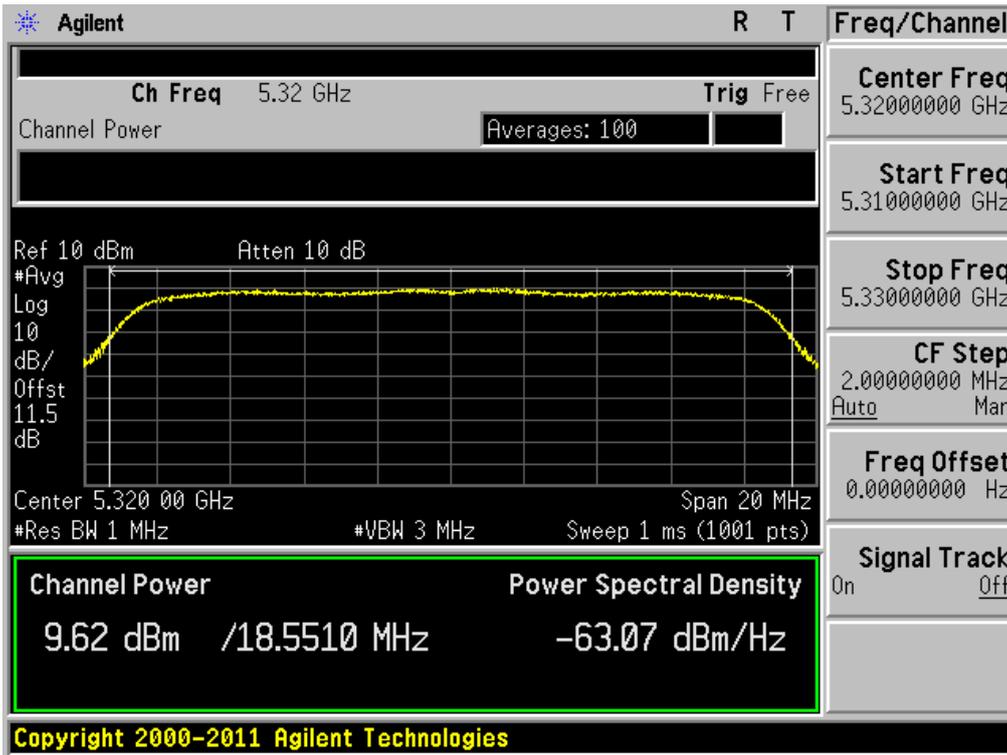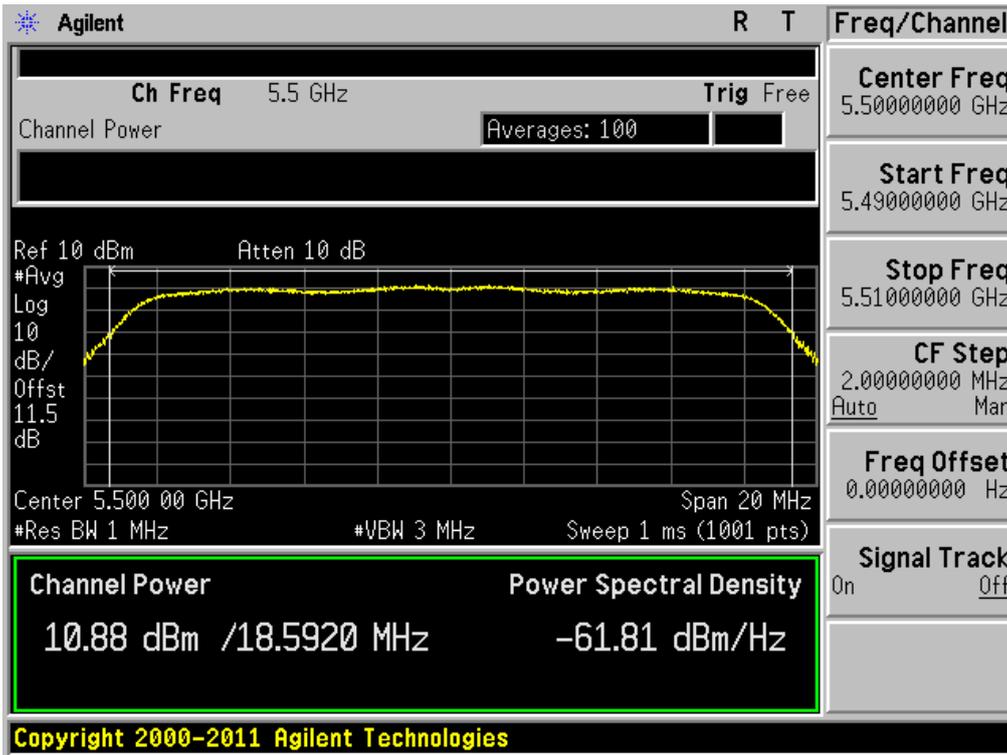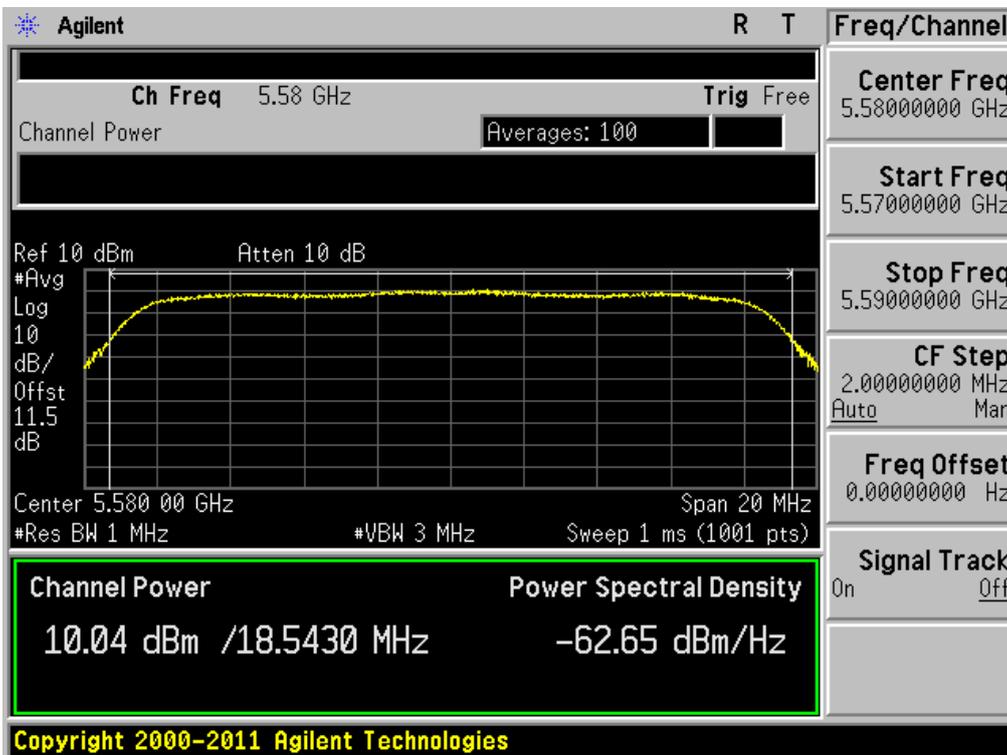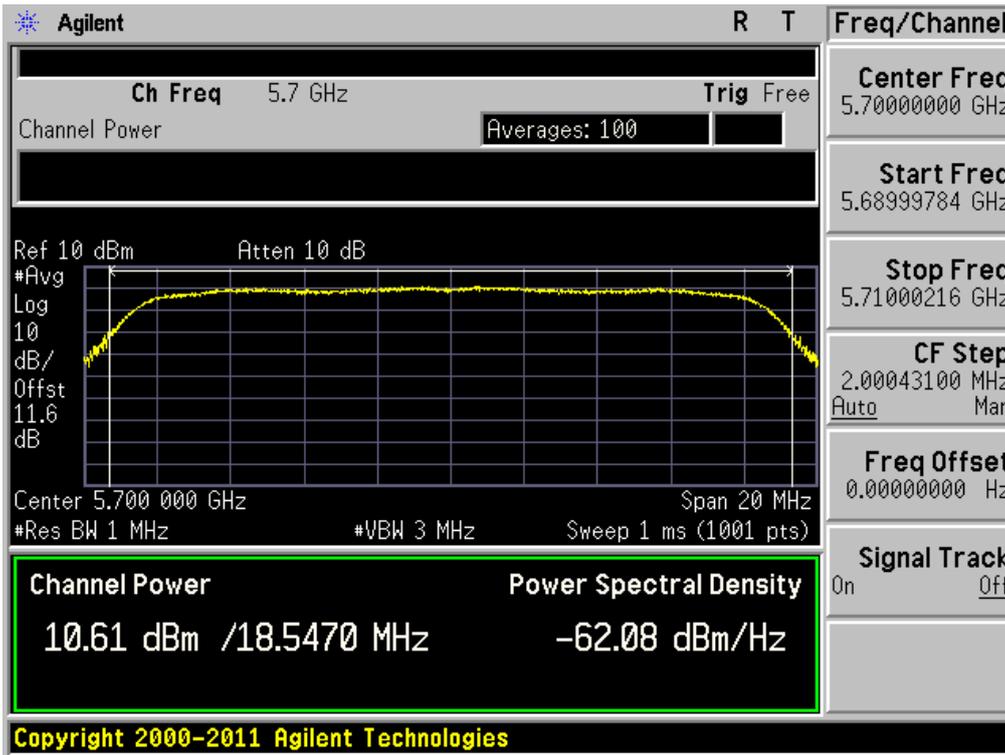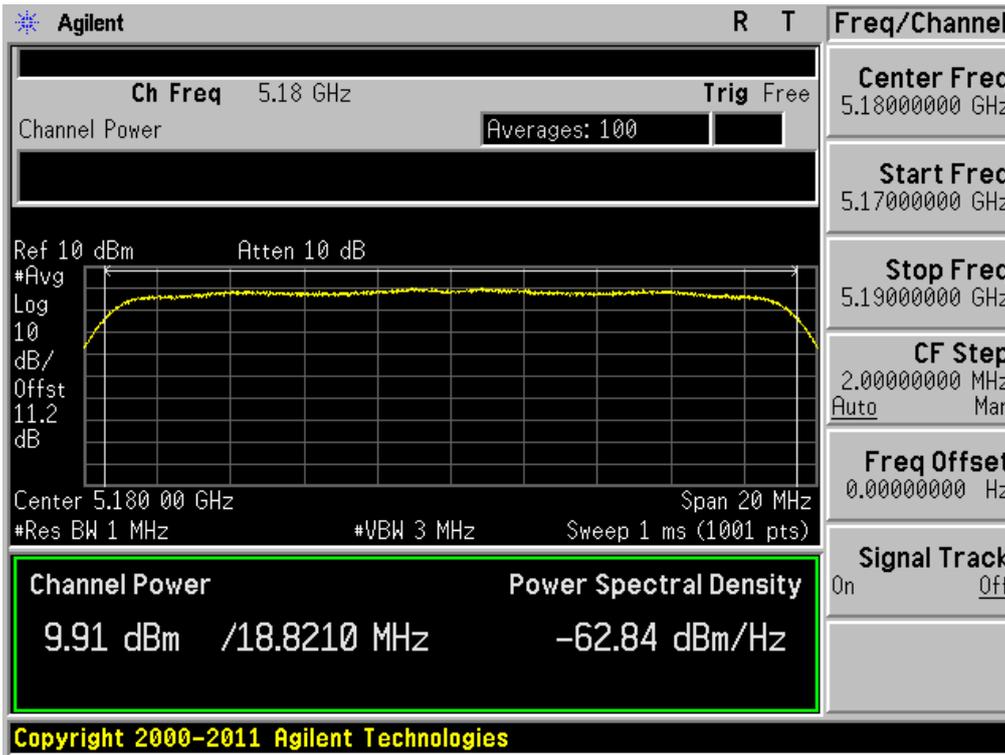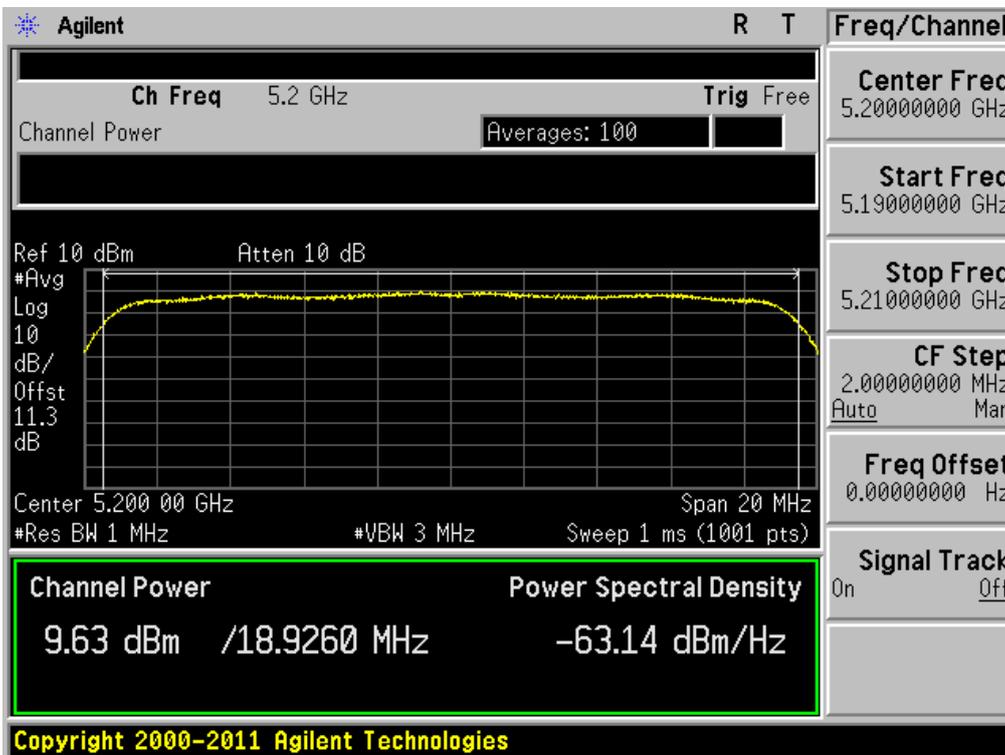**Output Power**   Test Mode: 802.11a & Ch.52

Channel Power	Power Spectral Density
9.73 dBm /18.6580 MHz	−62.98 dBm/Hz

Output Power   Test Mode: 802.11a & Ch.60

Channel Power	Power Spectral Density
9.48 dBm /18.5400 MHz	−63.20 dBm/Hz

Output Power   Test Mode: 802.11a & Ch.64

Output Power   Test Mode: 802.11a   &   Ch.100

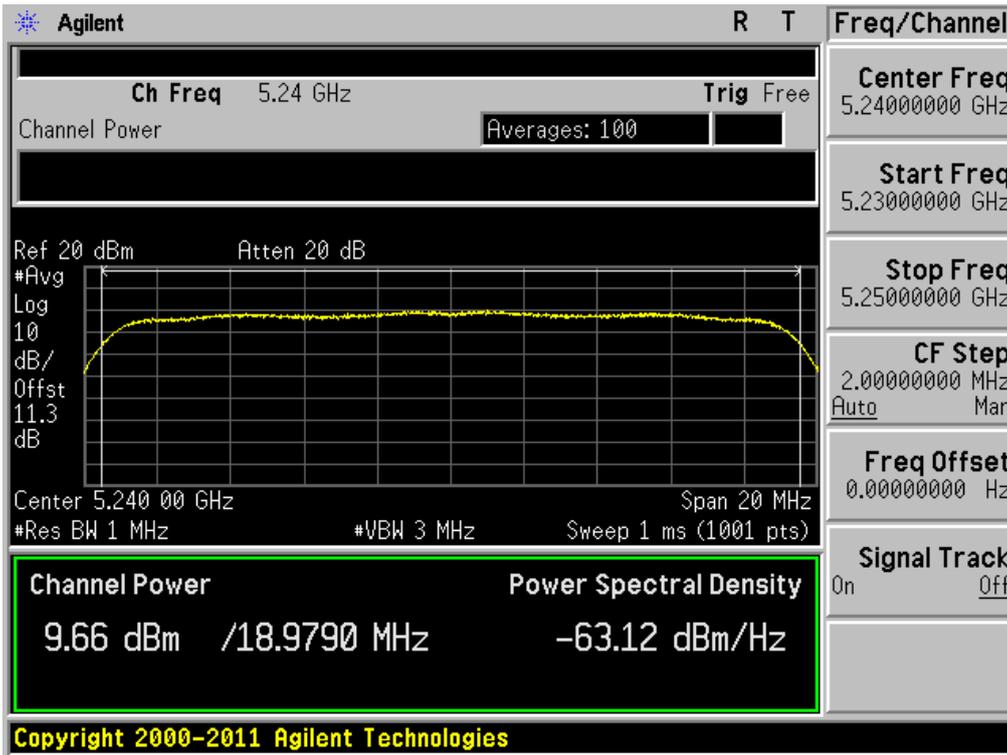**Output Power**   Test Mode: 802.11a   &   Ch.116

Output Power   Test Mode: 802.11a & Ch.140

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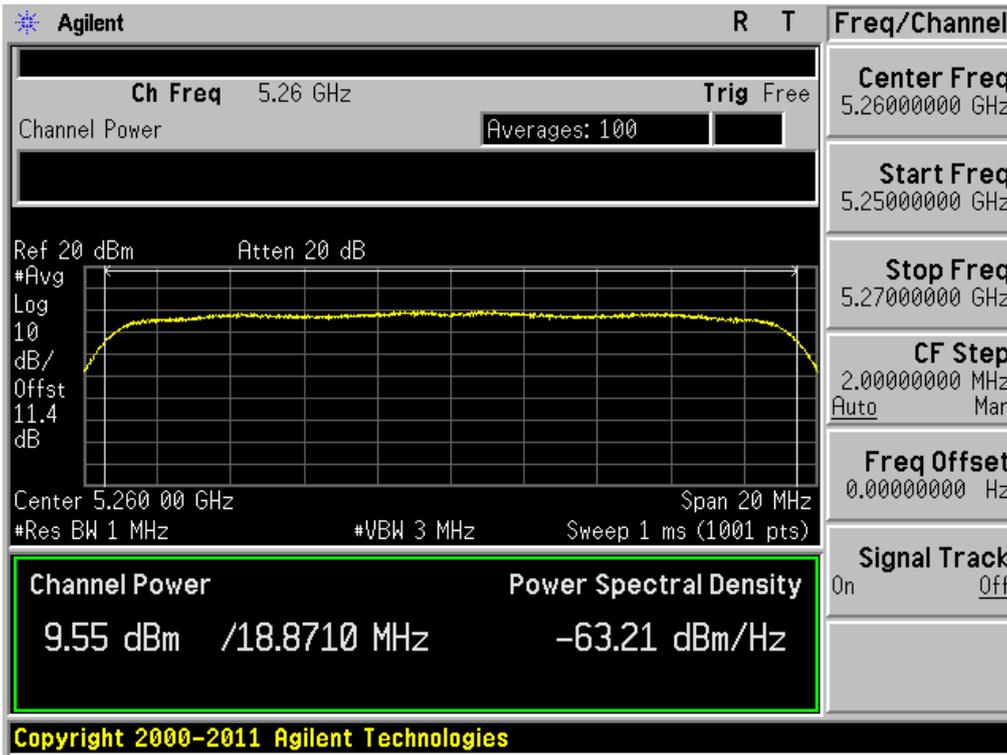**Output Power**   Test Mode: 802.11n HT20   &   Ch.36

Output Power   Test Mode: 802.11n HT20   &   Ch.40

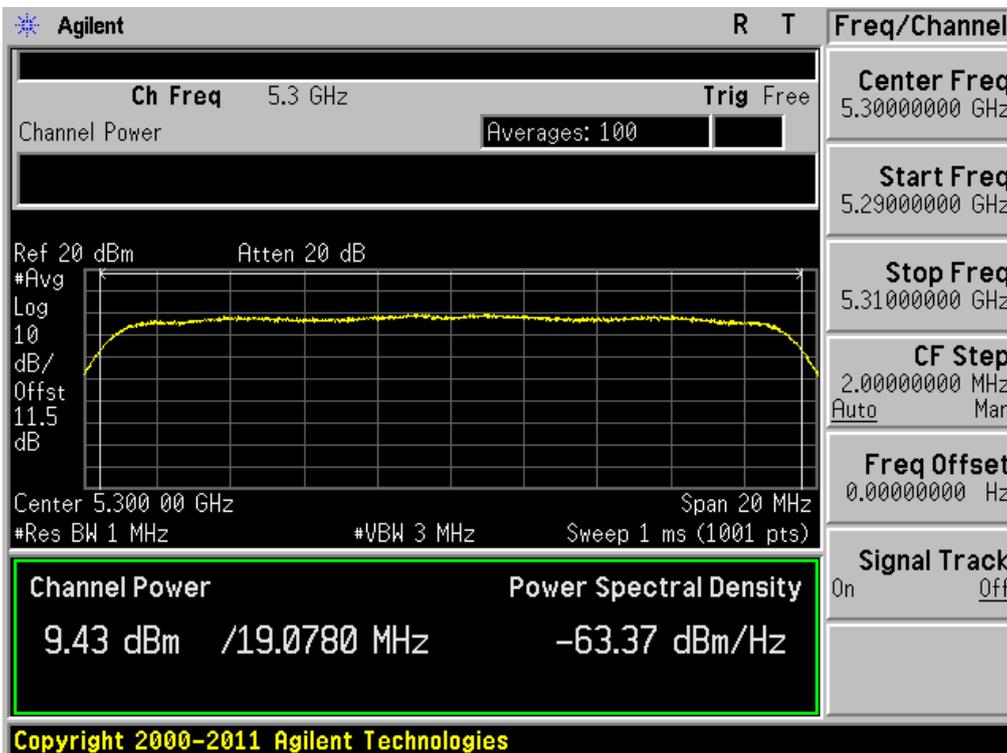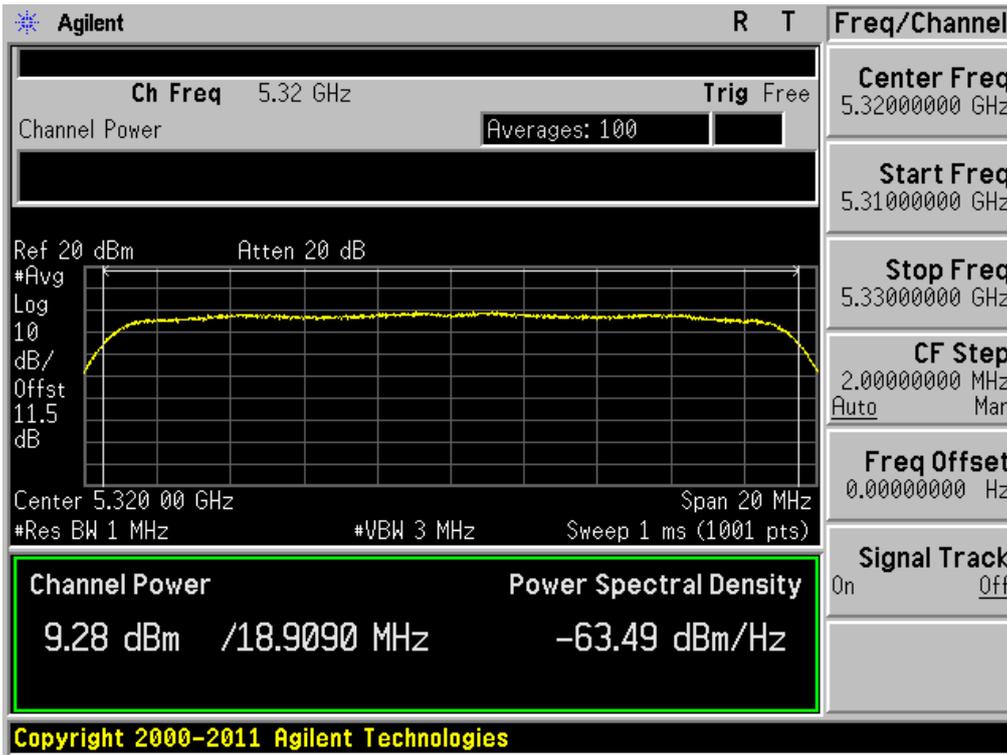**Output Power**   Test Mode: 802.11n HT20 & Ch.48

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Output Power   Test Mode: 802.11n HT20 & Ch.52

Output Power   Test Mode: 802.11n HT20 & Ch.60

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Output Power   Test Mode: 802.11n HT20 & Ch.64

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Output Power   Test Mode: 802.11n HT20   &   Ch.100
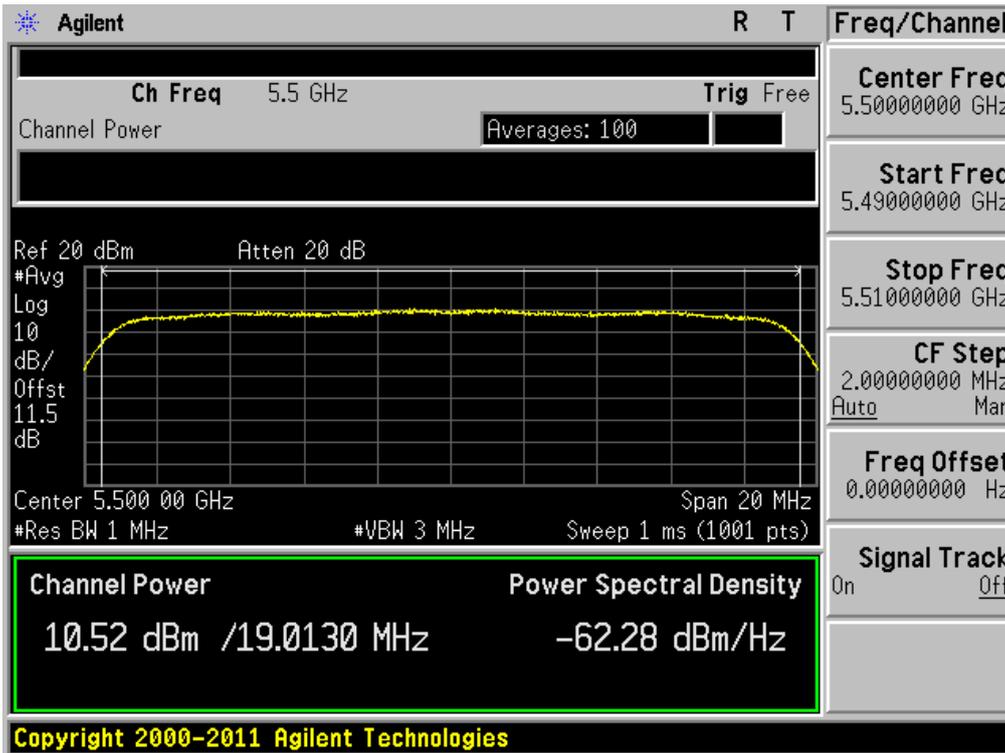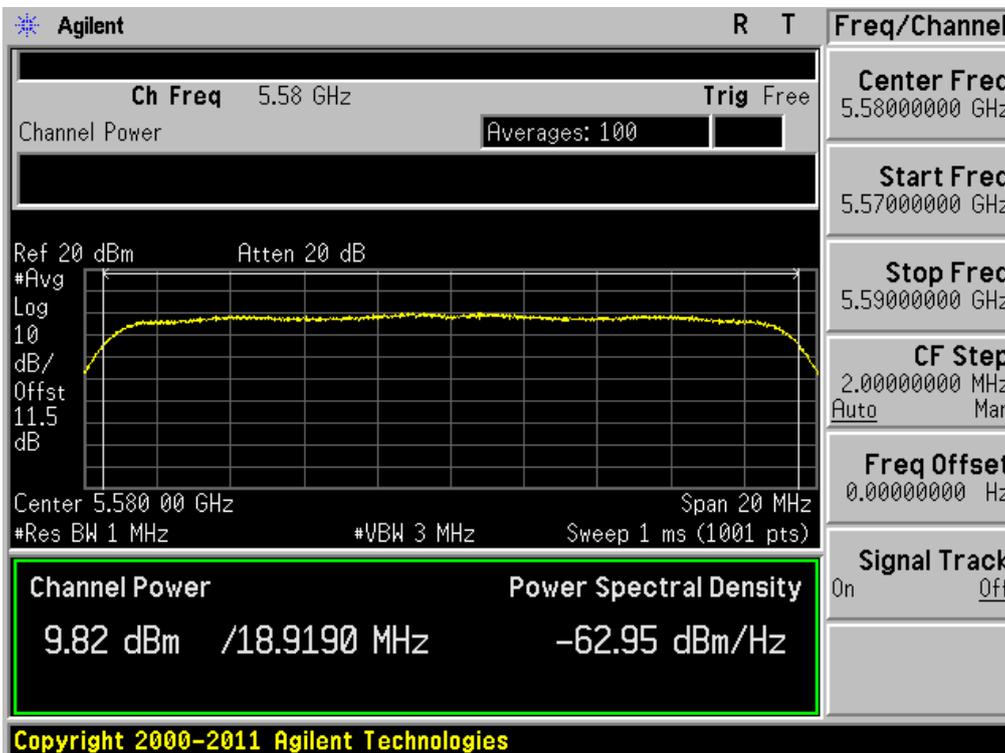

Output Power   Test Mode: 802.11n HT20   &   Ch.116

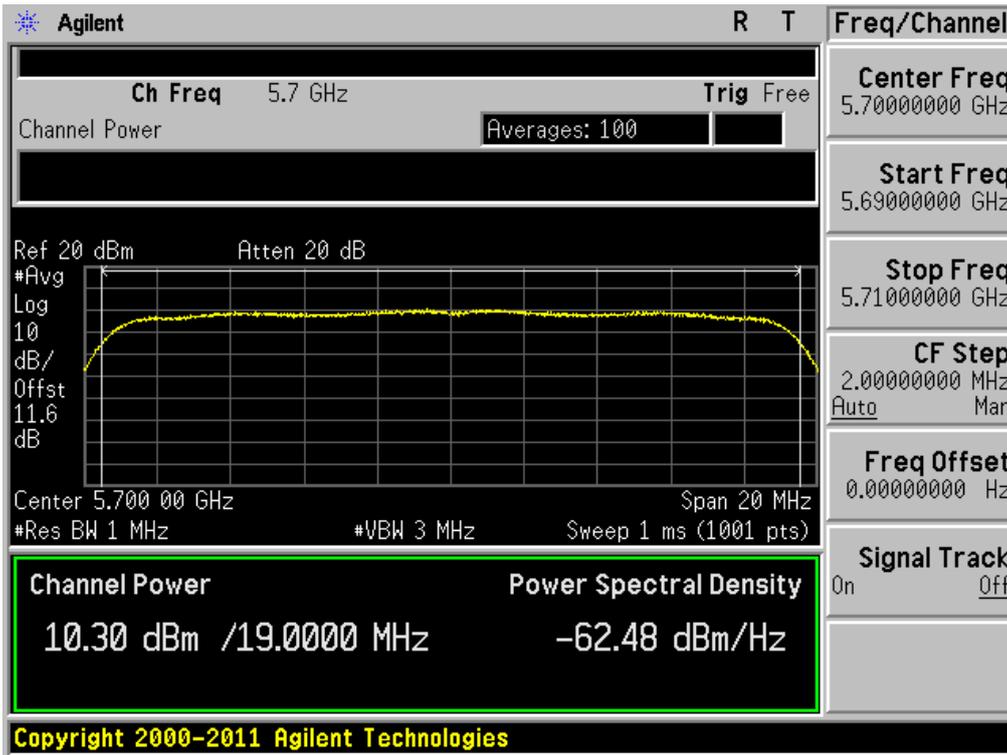**Output Power**   Test Mode: 802.11n HT20   &   Ch.140

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3.2.3 Peak Power Spectral Density

Test requirements

(1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1MHz band.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band.
If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Peak Power Spectral Density Limit Calculation

Band	Limit [dBm]	ANT Gain [dBi]	Determined Limit [dBm]
Band I	4	-0.63	4
Band II	11	-0.63	11
Band III	11	-0.63	11

▣ **TEST CONFIGURATION**

Refer to the APPENDIX I.

▣ **TEST PROCEDURE**

Peak Power Spectral Density is measured using Measurement Procedure **of KDB789033**

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section C)3) for measuring maximum conducted output power using a spectrum analyzer: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2) Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
3) Make the following adjustments to the peak value of the spectrum, if applicable:
   a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in step C)3)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4) The result is the PPSD.

▣ **TEST RESULT : Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11a	36	5180	0.128	2.06	2.16	0.95	0.23	0.358
	40	5200	0.517					0.747
	48	5240	0.615					0.845
	52	5260	0.437	2.06	2.16	0.95	0.23	0.667
	60	5300	0.589					0.819
	64	5320	0.544					0.774
	100	5500	1.456	2.06	2.16	0.95	0.23	1.686
	116	5580	1.683					1.913
	140	5700	2.121					2.351

Mode	Channel	Frequency [MHz]	Reading [dBm]	Duty Cycle			DCF [dB]	Test Result [dBm]
				On Time[ms]	On+Off Time[ms]	X		
802.11n (20MHz)	36	5180	-0.192	1.92	2.02	0.95	0.23	0.038
	40	5200	-0.288					-0.058
	48	5240	0.067					0.297
	52	5260	0.391	1.92	2.02	0.95	0.23	0.621
	60	5300	0.440					0.670
	64	5320	0.354					0.584
	100	5500	1.832	1.92	2.02	0.95	0.23	2.062
	116	5580	1.289					1.519
	140	5700	1.649					1.879
-802.11n (40MHz)	-	-	-	-	-	-	-	-
	-	-	-					-
	-	-	-	-	-	-	-	-
	-	-	-					-
	-	-	-	-	-	-	-	-
	-	-	-					-
	-	-	-					-

Note 1 : DCF = 10log(1 / X),   X = On Time / (On+Off time)
Note 2 : Test Result = Measurement Data + DCF

◙ **Measurement Data PLOTS**
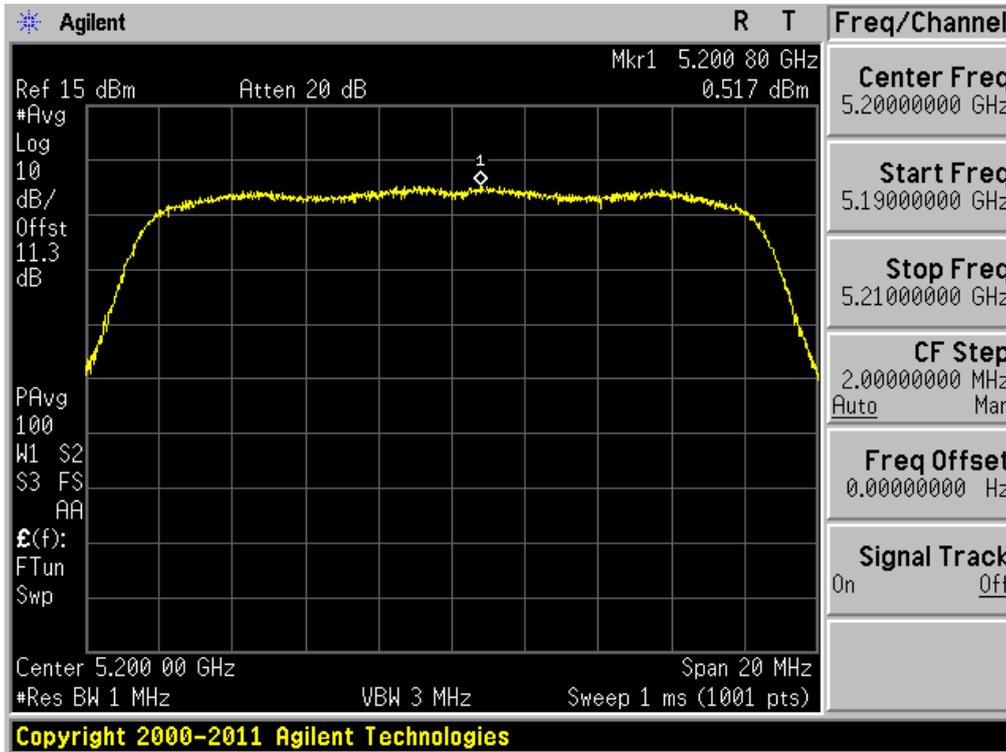
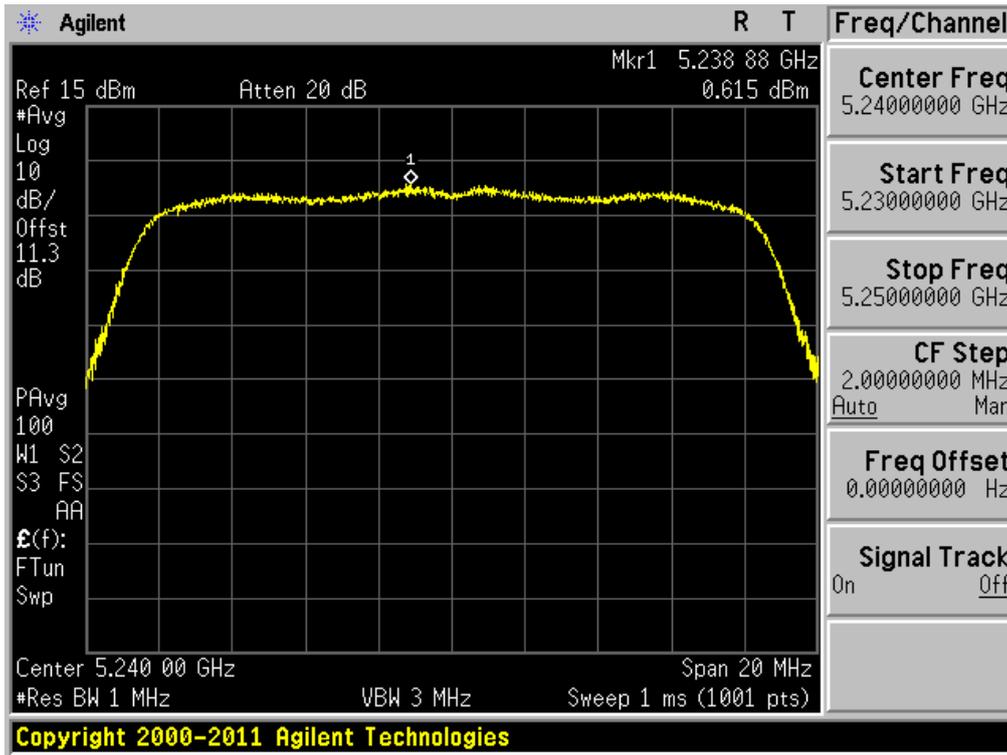**Peak Power Spectral Density**   Test Mode: 802.11a & Ch.36
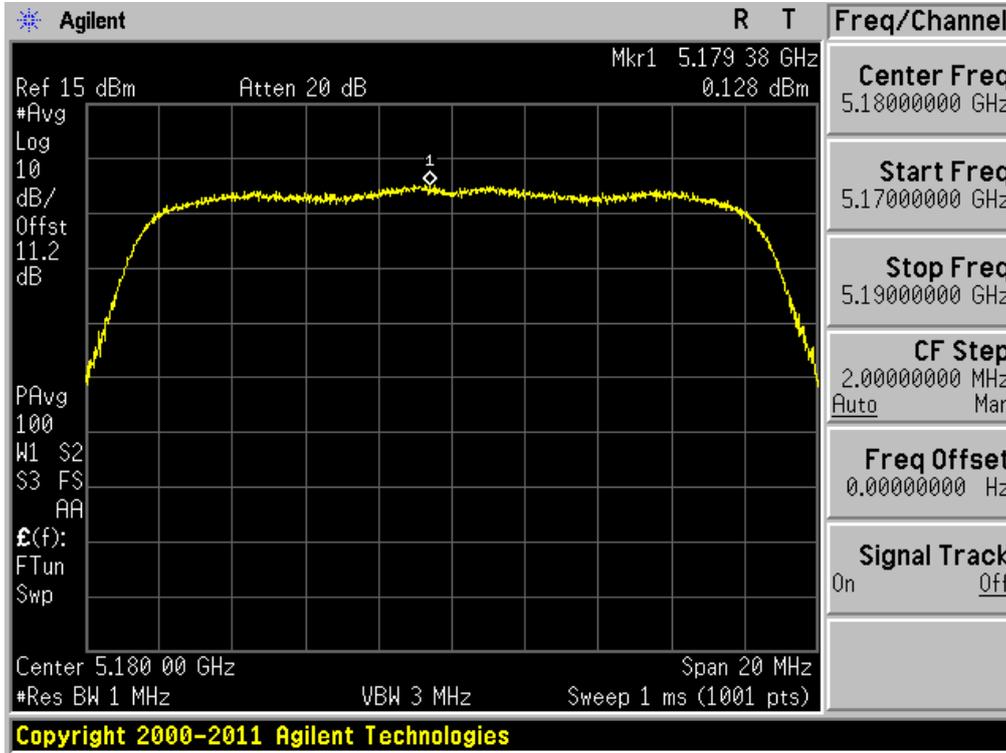
Peak Power Spectral Density   Test Mode: 802.11a & Ch.40

Peak Power Spectral Density   Test Mode: 802.11a & Ch.48

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Peak Power Spectral Density   Test Mode: 802.11a   &   Ch.52

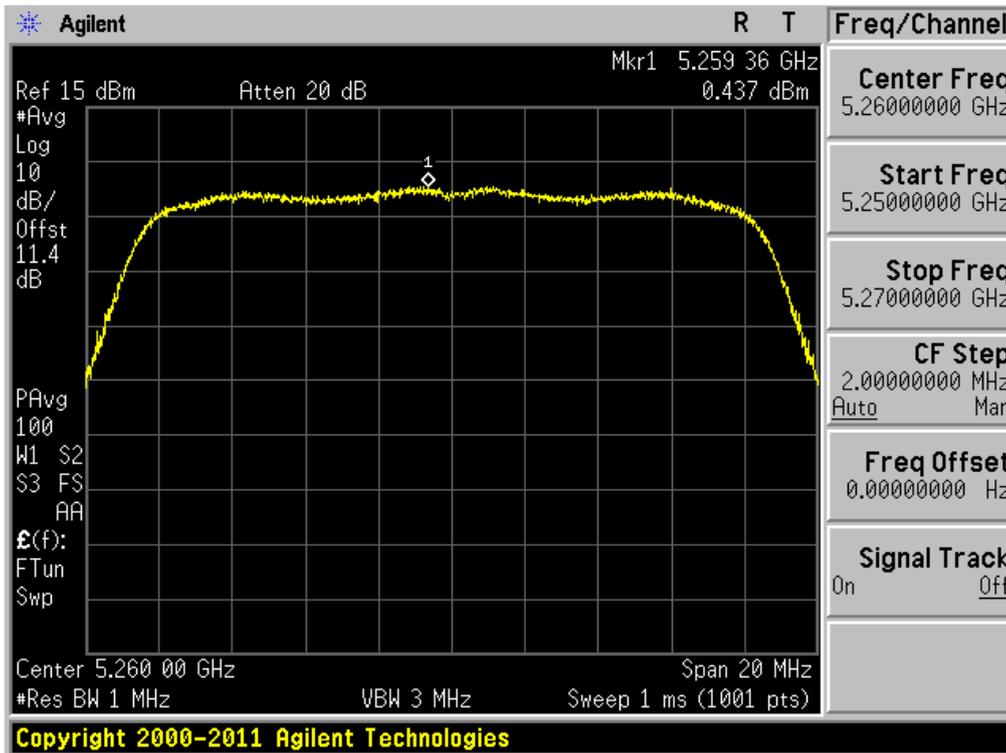**Peak Power Spectral Density**   Test Mode: 802.11a   &   Ch.60

Peak Power Spectral Density   Test Mode: 802.11a & Ch.64

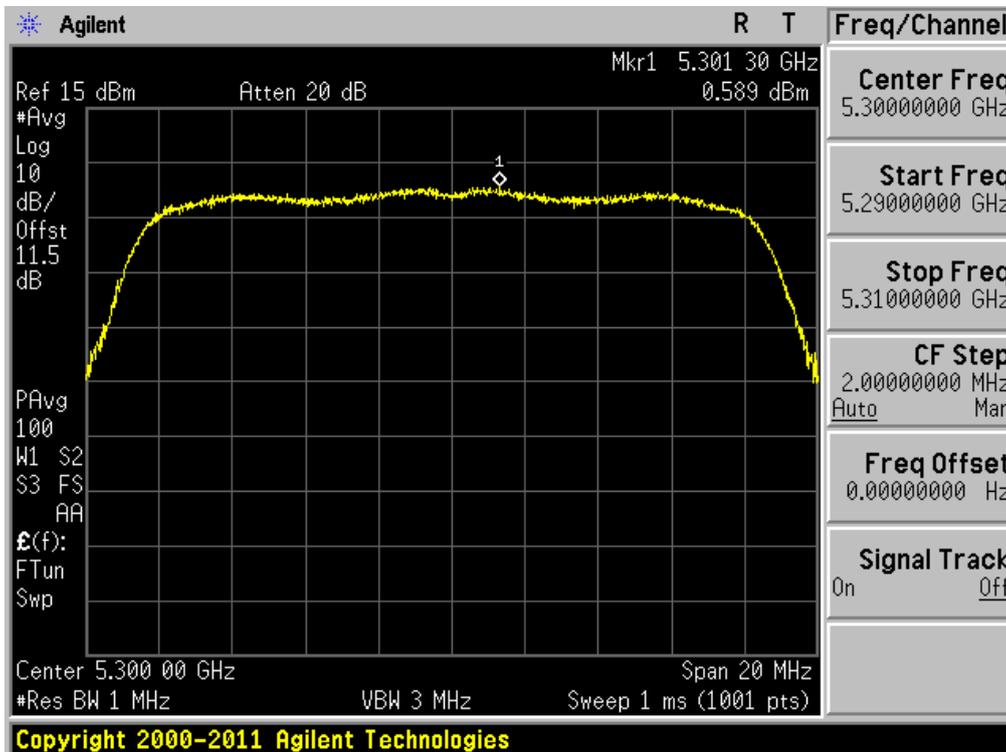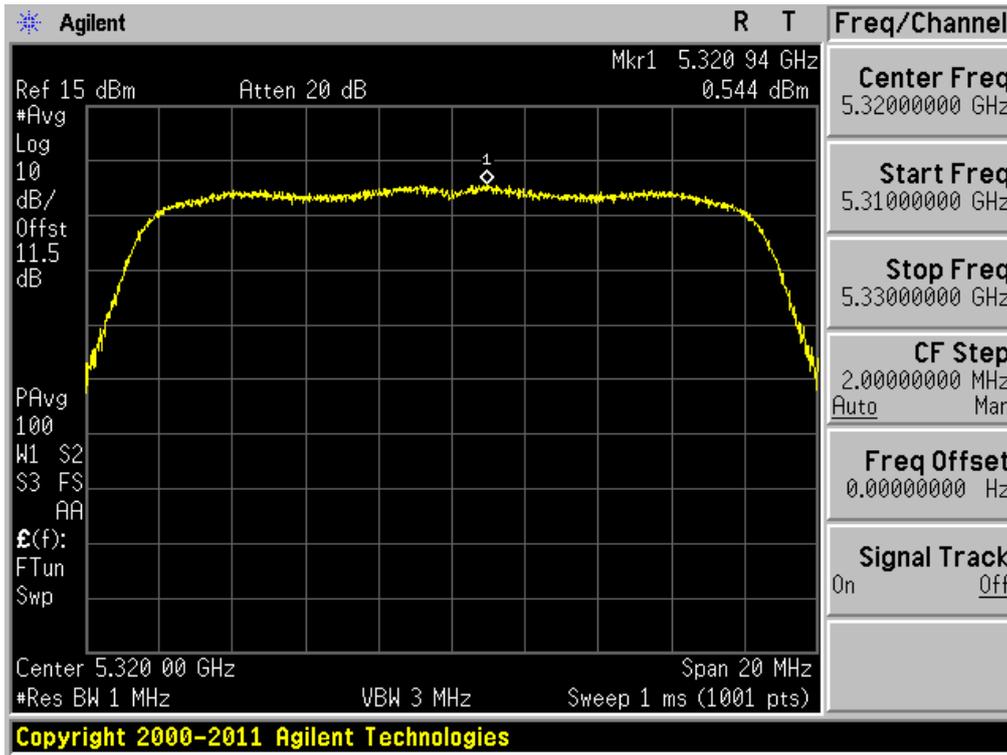**Peak Power Spectral Density**   Test Mode: 802.11a & Ch.100

Peak Power Spectral Density   Test Mode: 802.11a & Ch.116

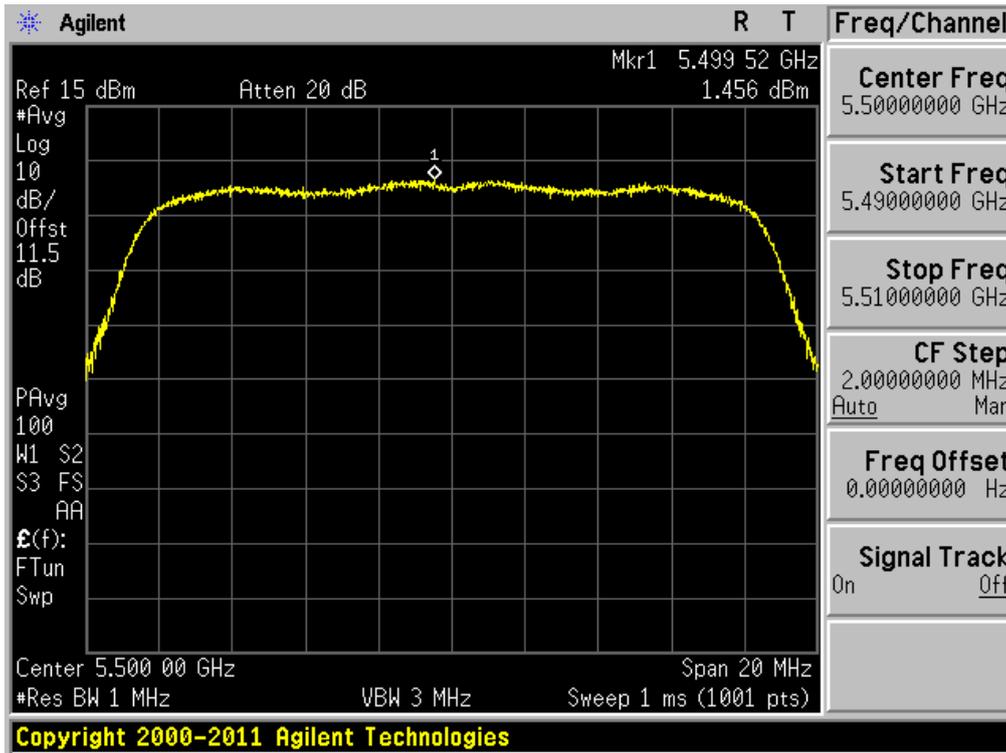**Peak Power Spectral Density**   Test Mode: 802.11a   &   Ch.140

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Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.36

Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.40

Peak Power Spectral Density   Test Mode: 802.11n HT20   &   Ch.48

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Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.52

Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.60

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Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.64

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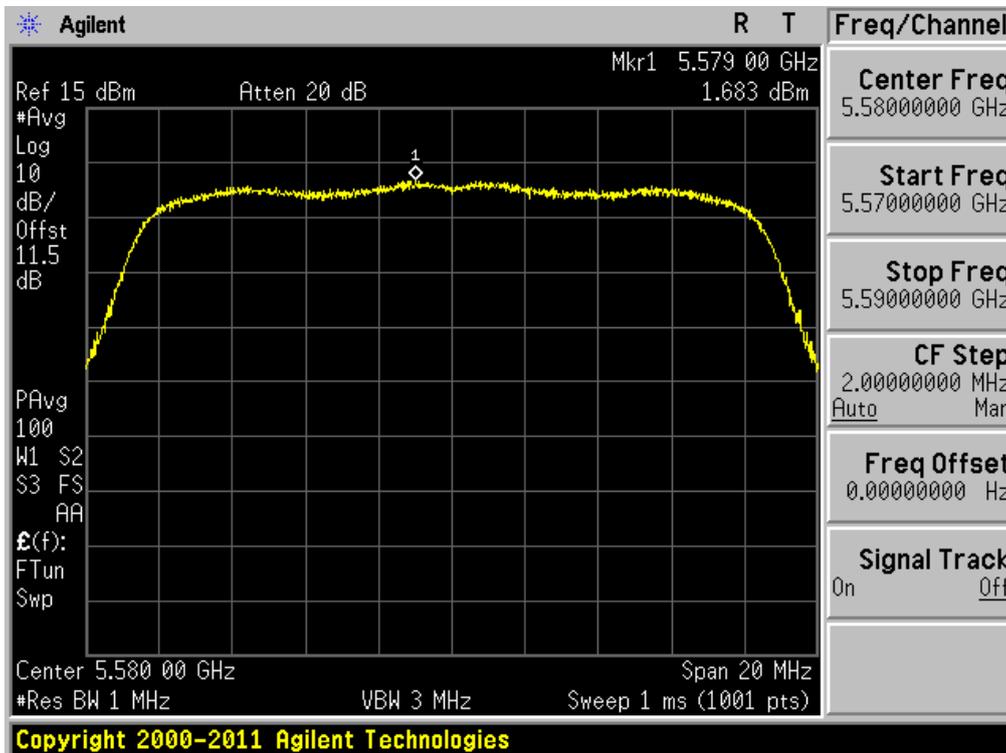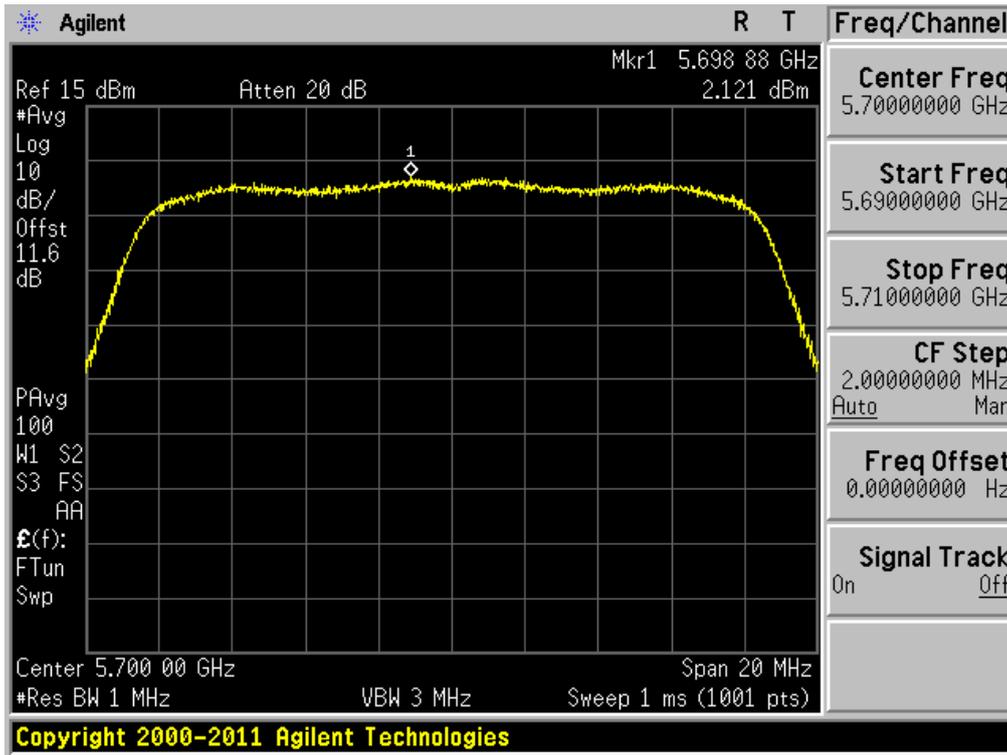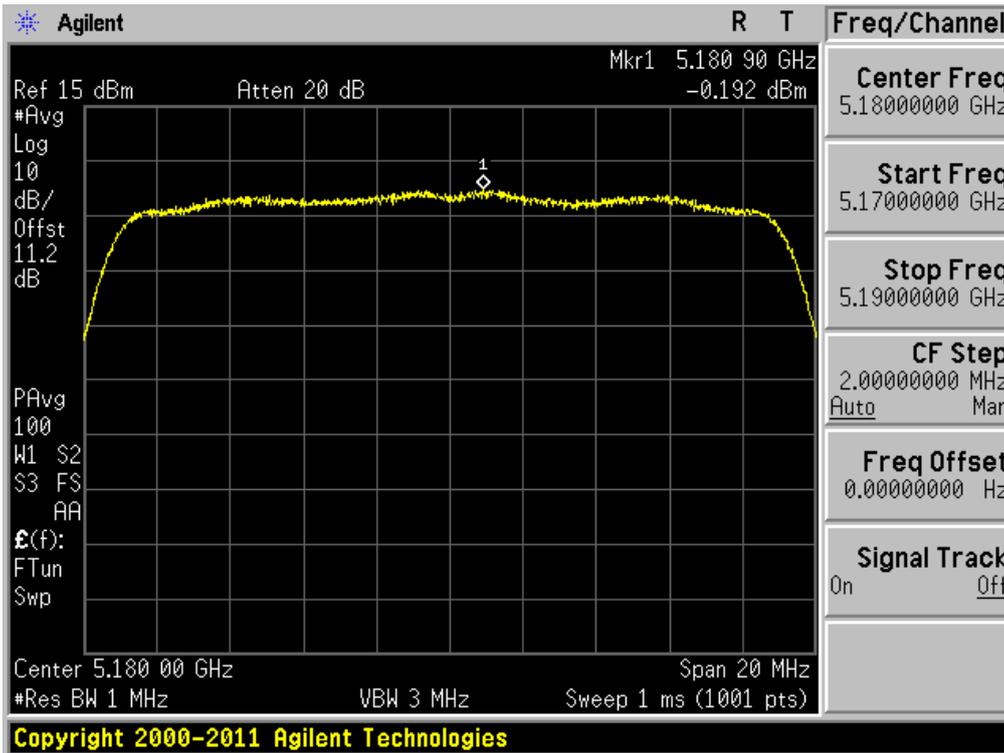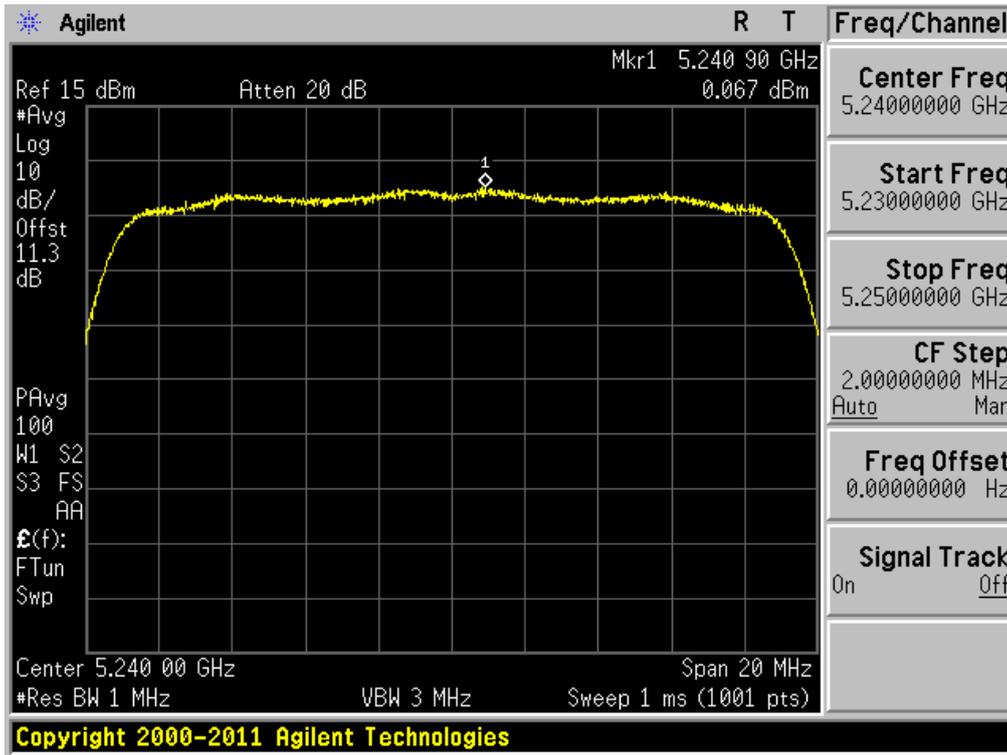
Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.100

Peak Power Spectral Density   Test Mode: 802.11n HT20 & Ch.116

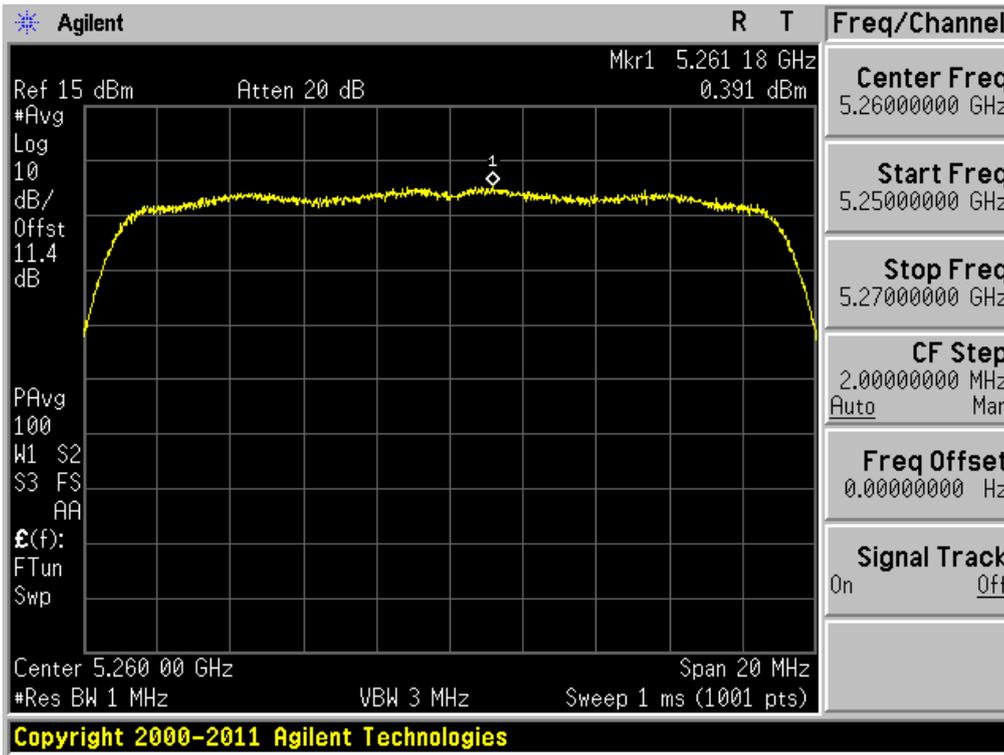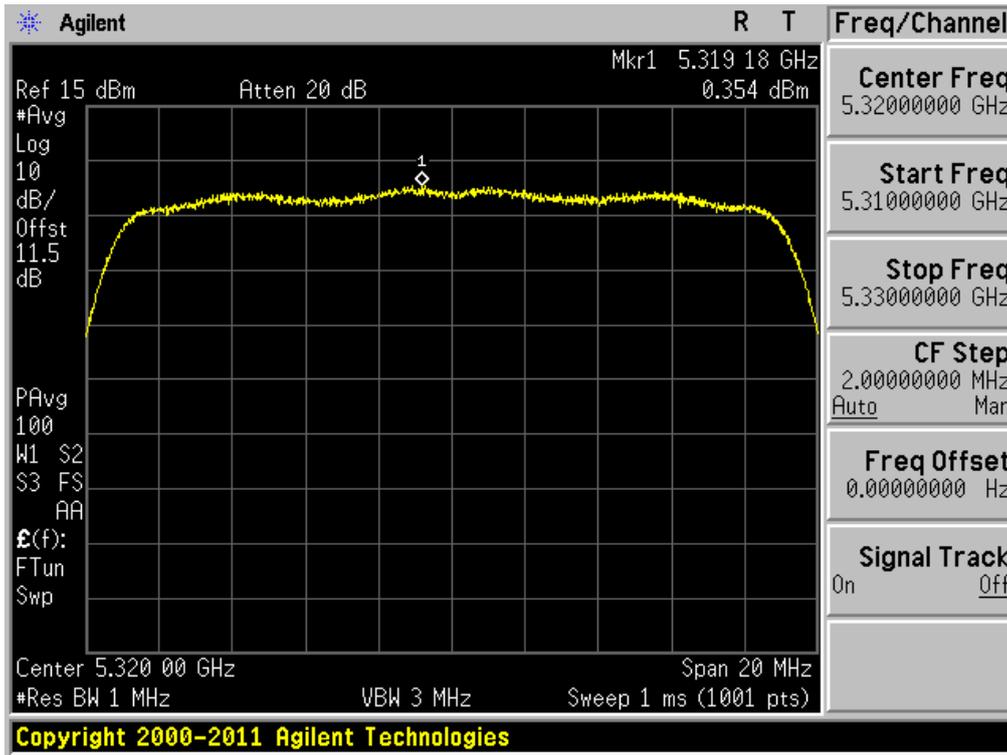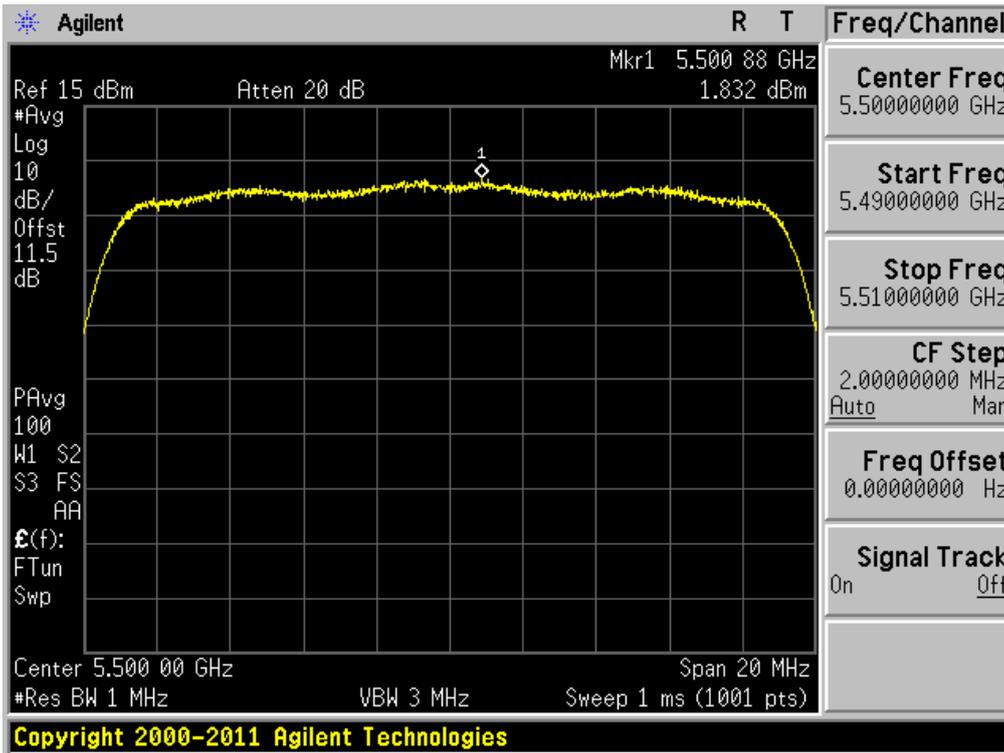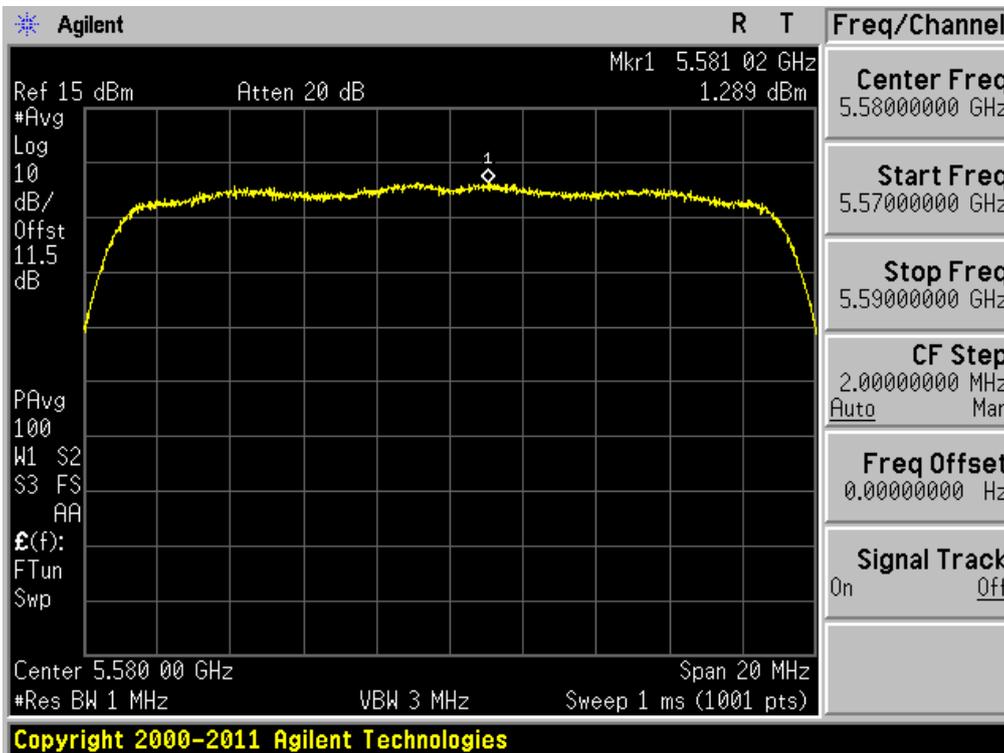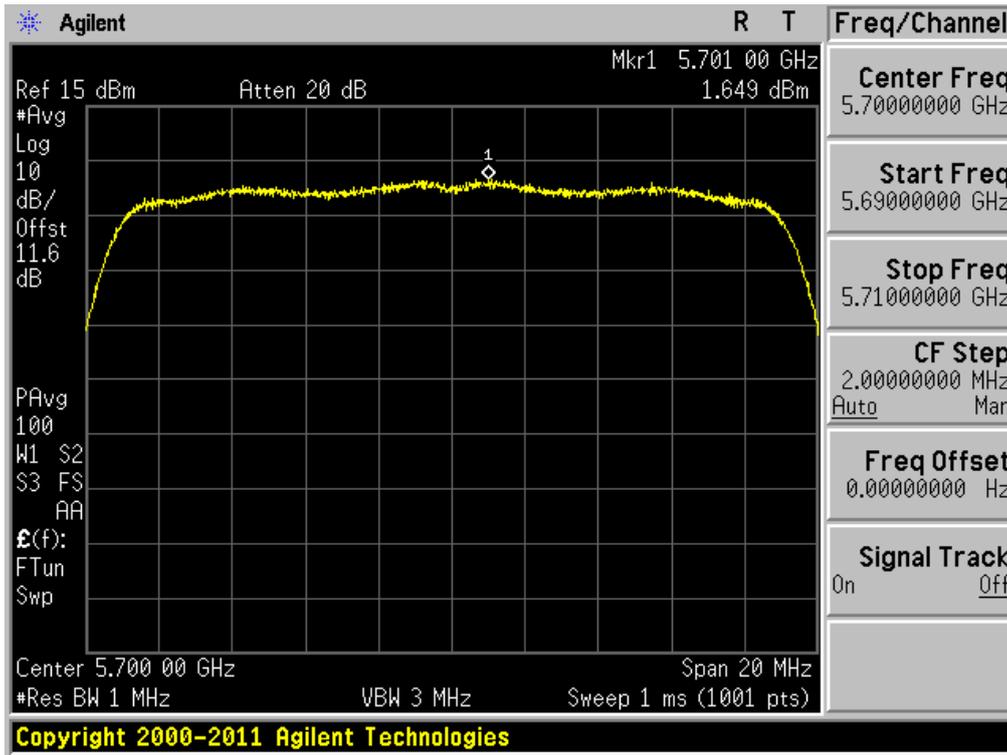**Peak Power Spectral Density**   Test Mode: 802.11n HT20 & Ch.140

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3.2.4 Peak Excursion Ratio

Test requirements

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed **13 dB/MH**z.

◾ **TEST CONFIGURATION**

Refer to the APPENDIX I.

◾ **TEST PROCEDURE**

Peak Excursion Ratio is measured using Measurement Procedure **of KDB789033**

1) Compliance with the peak excursion requirement of Section 15.407(a)(6) shall be demonstrated by confirming that the ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission does not exceed 13 dB. (Earlier procedures that required computing the ratio of the two spectra at each frequency across the emission bandwidth can lead to unintended failures at band edges and will no longer be required.)
2) Set the spectrum analyzer span to view the entire emission bandwidth.
3) Find the maximum of the peak-max-hold spectrum.
    a) Set **RBW = 1 MHz.**
    b) **VBW ≥ 3 MHz**.
    c) **Detector = peak.**
    d) **Trace mode = max-hold.**
    e) Allow the sweeps to continue until the trace stabilizes.
    f) Use the peak search function to find the peak of the spectrum.
4) **Use the procedure found under E) to measure the PPSD.**
5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

◾ **TEST RESULT : Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [dB/MHz]	Limit [dB/MHz]
802.11a	Band I	36	5180	8.430	
		40	5200	7.593	
		48	5240	7.200	
	Band II	52	5260	7.886	
		60	5300	8.301	
		64	5320	7.804	
	Band III	100	5500	7.699	
		116	5580	7.958	
		140	5700	7.181	
802.11n (20MHz)	Band I	36	5180	8.148	13.000
		40	5200	7.840	
		48	5240	7.421	
	Band II	52	5260	7.748	
		60	5300	7.840	
		64	5320	7.425	
	Band III	100	5500	7.195	
		116	5580	7.859	
		140	5700	7.657	
802.11n (40MHz)	Band I	-	-	-	
		-	-	-	
	Band II	-	-	-	
		-	-	-	
	Band III	-	-	-	
		-	-	-	

■ **Measurement Data PLOTS**

Peak Excursion Ratio   Test Mode: 802.11a   &   Ch.36

Peak Excursion Ratio   Test Mode: 802.11a   &   Ch.40

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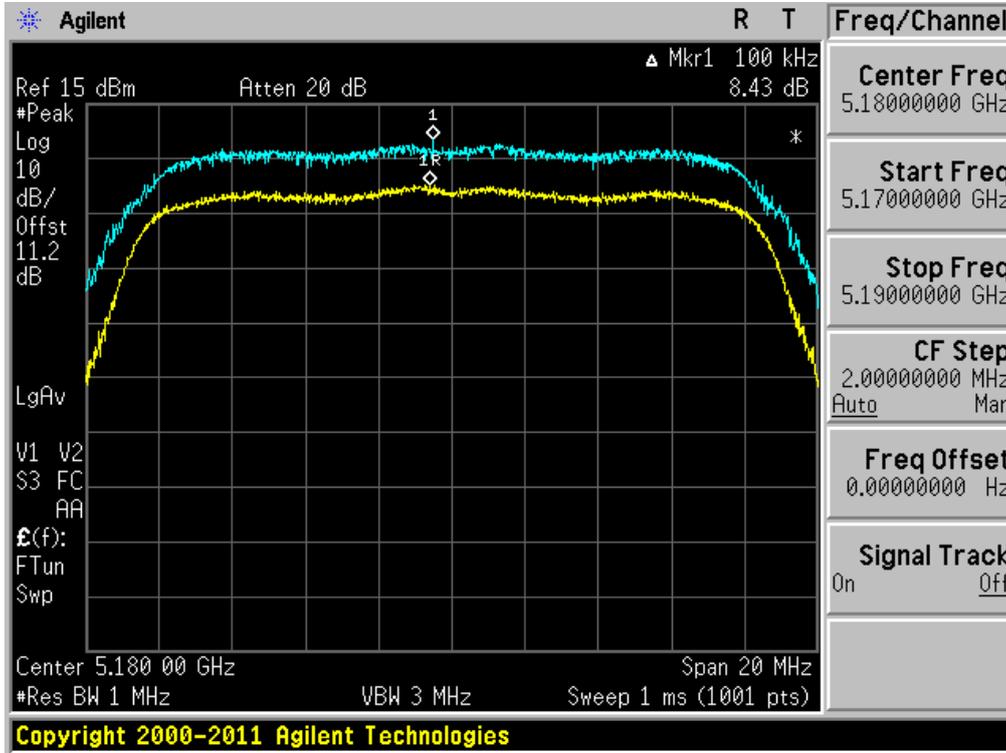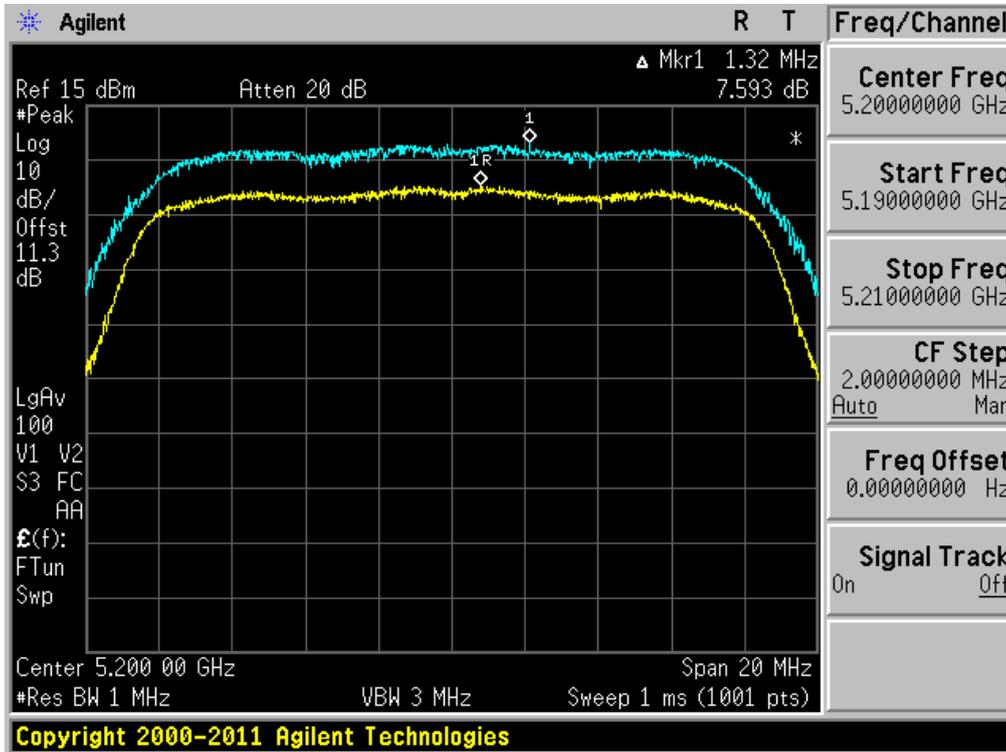
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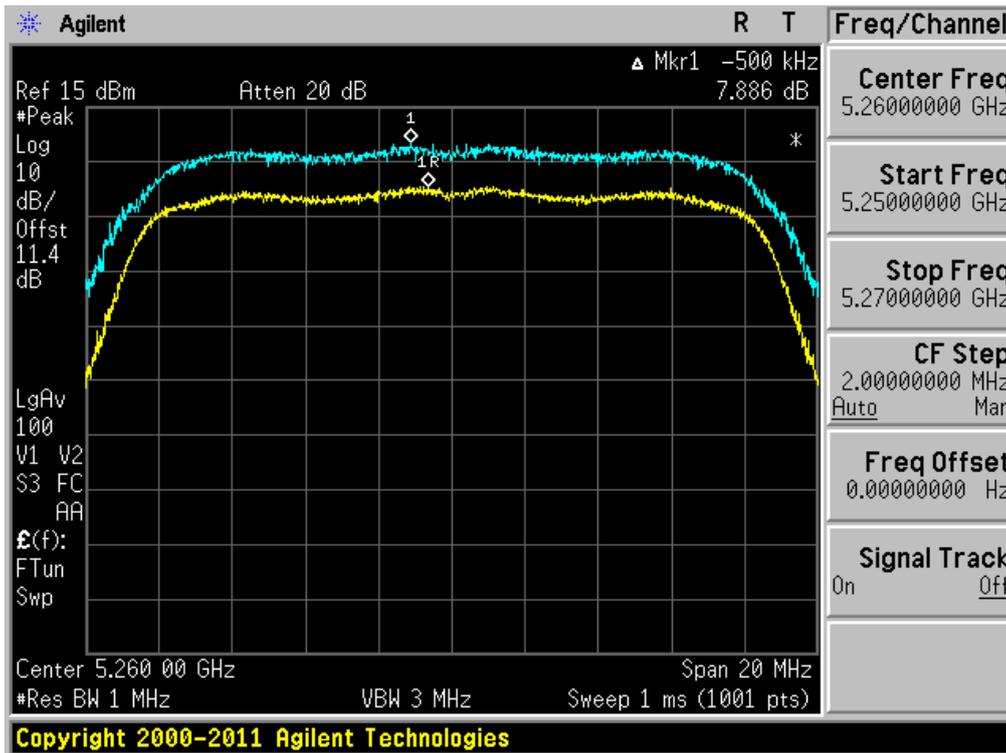
Peak Excursion Ratio   Test Mode: 802.11a & Ch.60

Peak Excursion Ratio   Test Mode: 802.11a & Ch.64

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Peak Excursion Ratio   Test Mode: 802.11a & Ch.100

Peak Excursion Ratio   Test Mode: 802.11a & Ch.116

Peak Excursion Ratio   Test Mode: 802.11a & Ch.140

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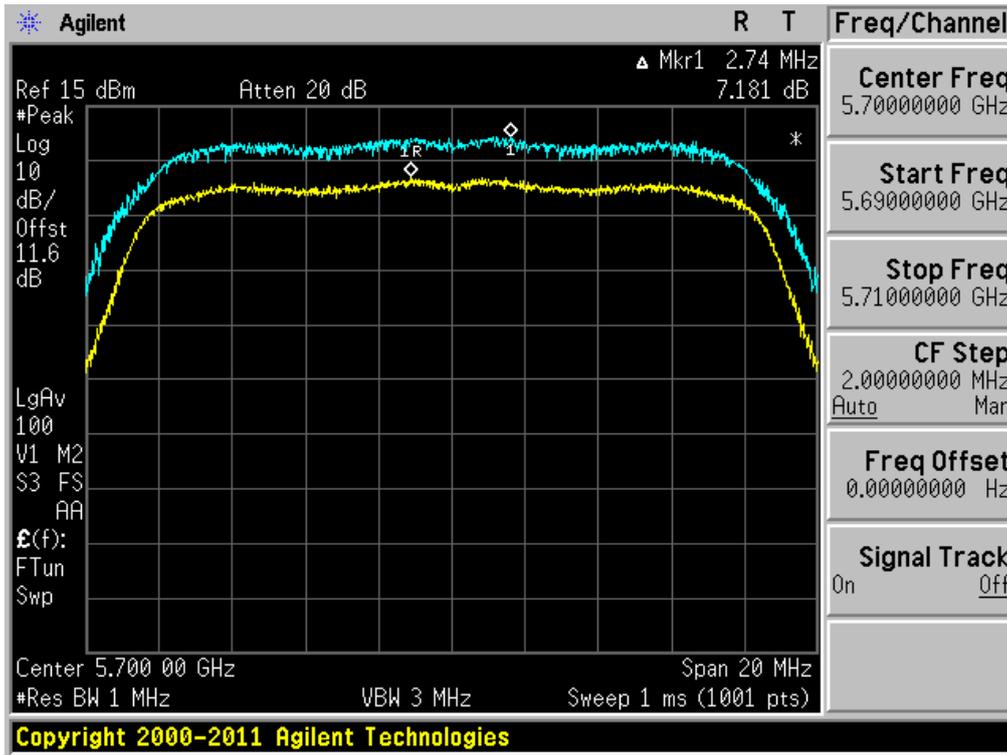
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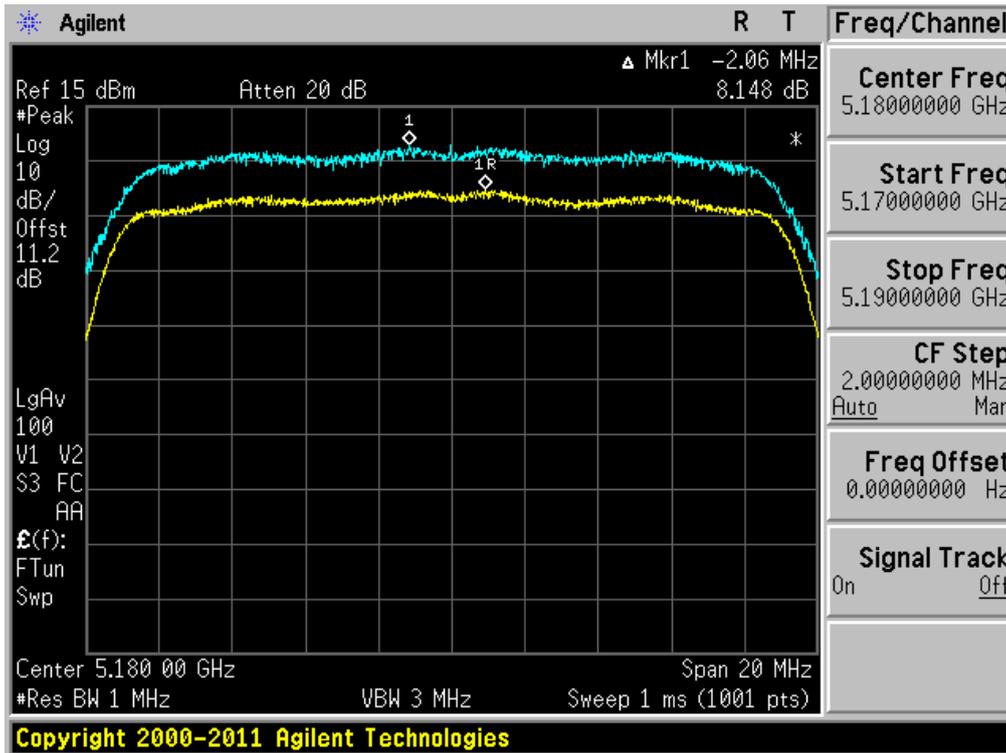
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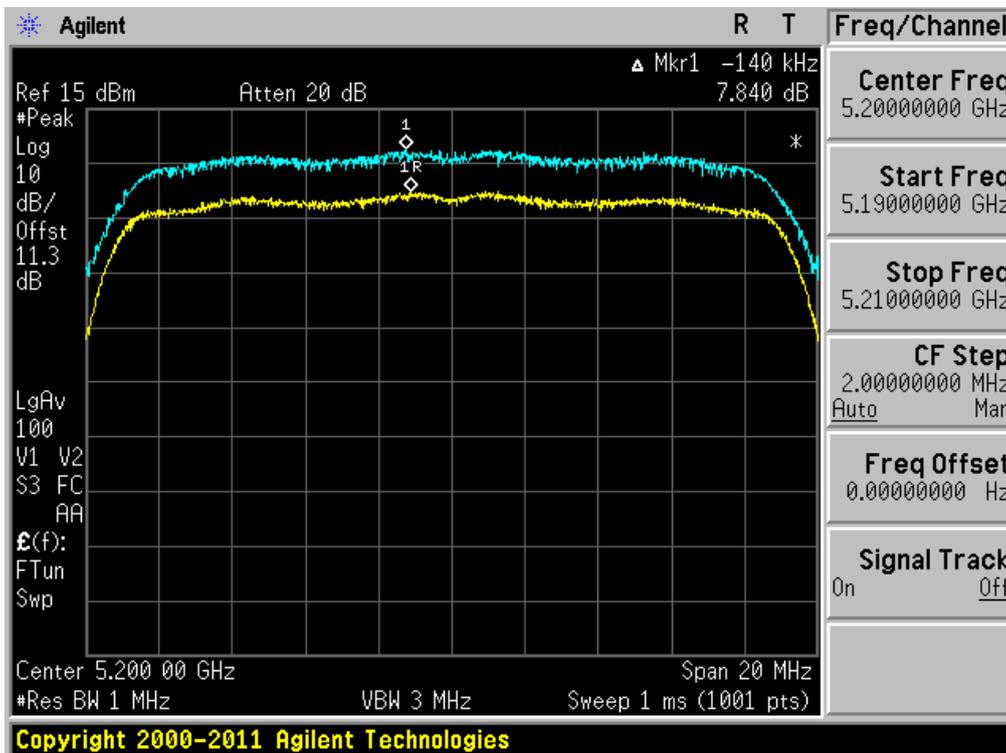
Peak Excursion Ratio   Test Mode: 802.11n HT20   &   Ch.48

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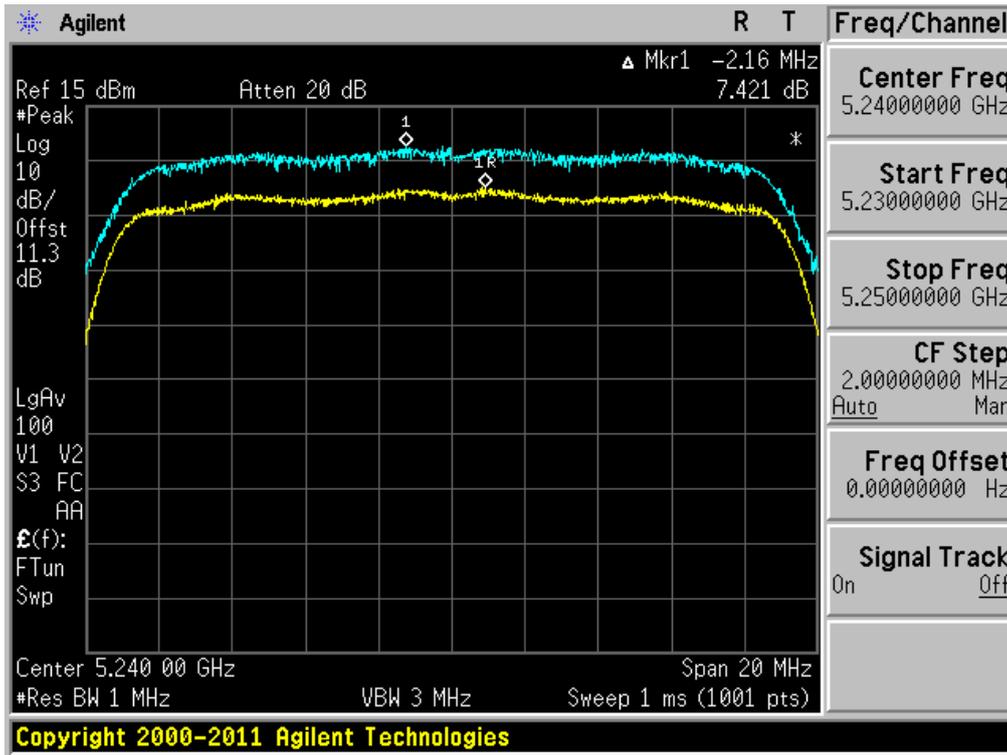
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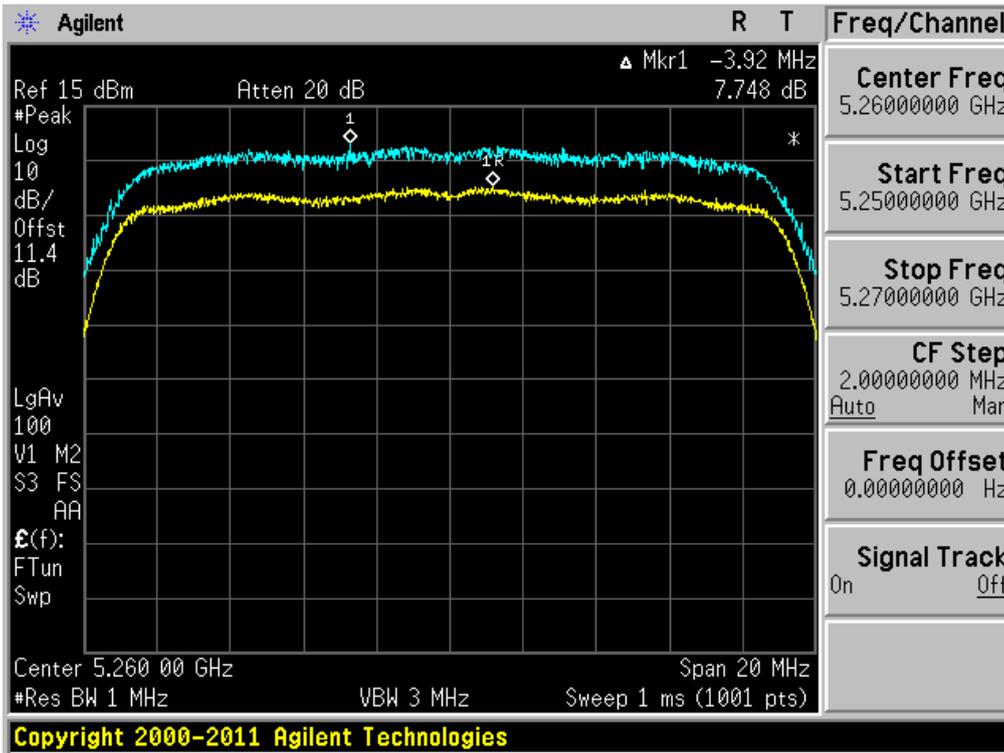
Peak Excursion Ratio   Test Mode: 802.11n HT20 & Ch.60
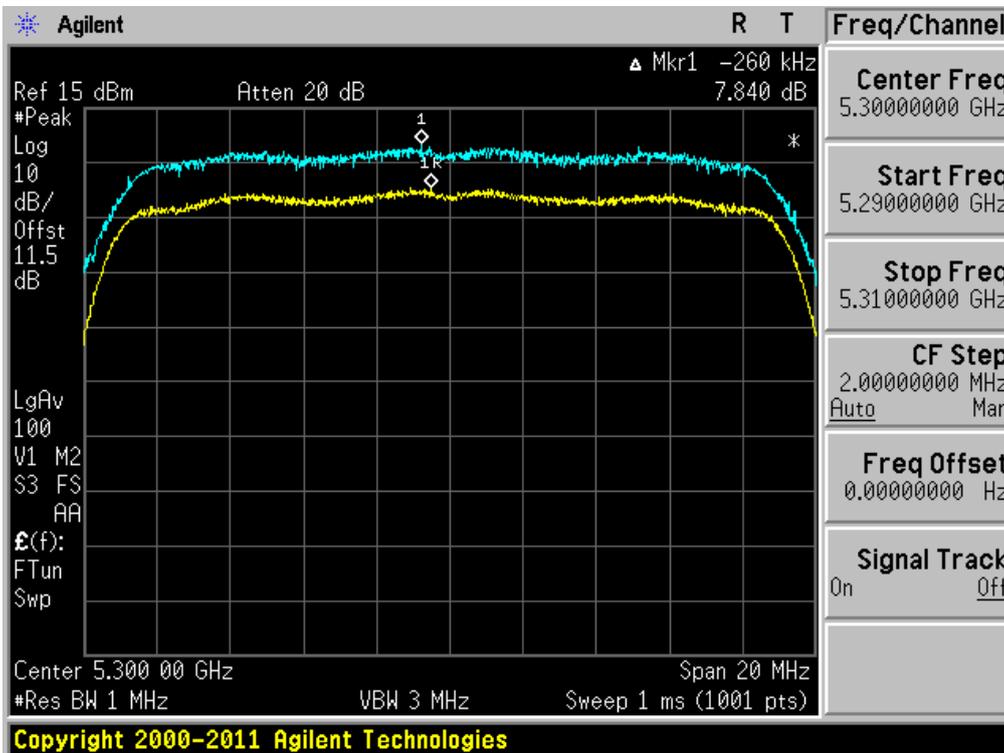
Peak Excursion Ratio   Test Mode: 802.11n HT20   &   Ch.64

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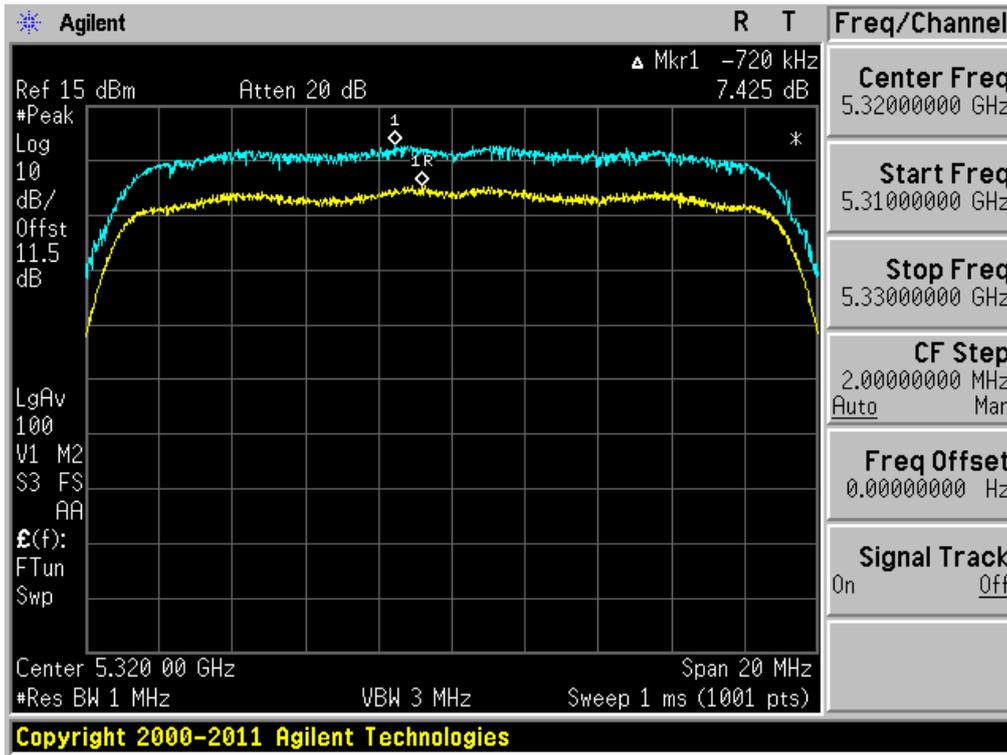
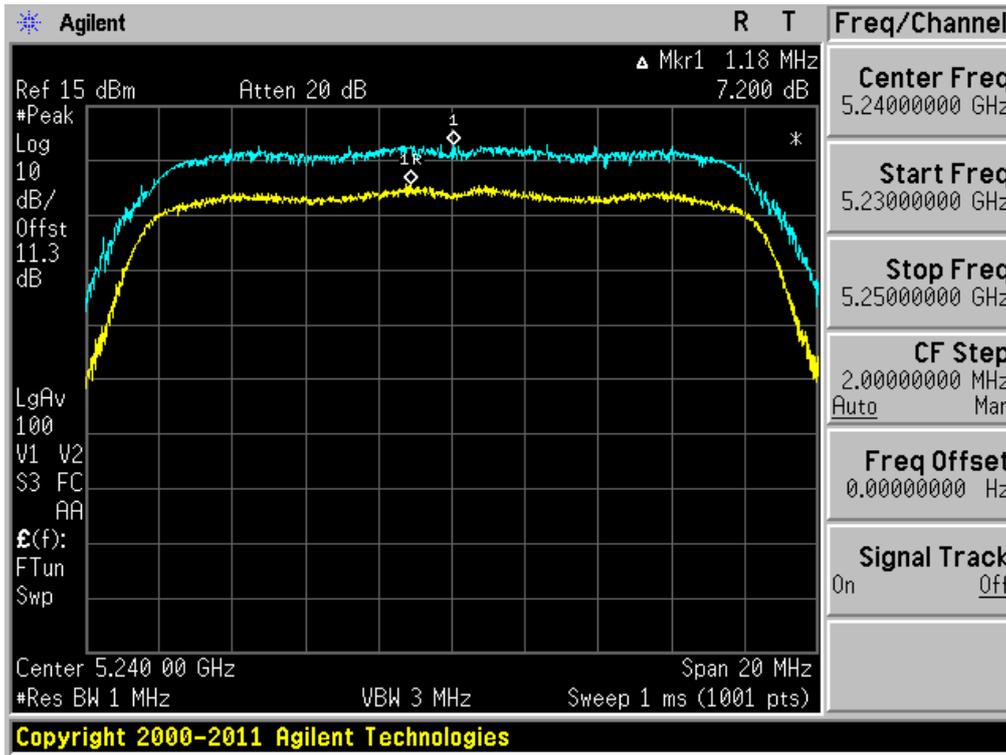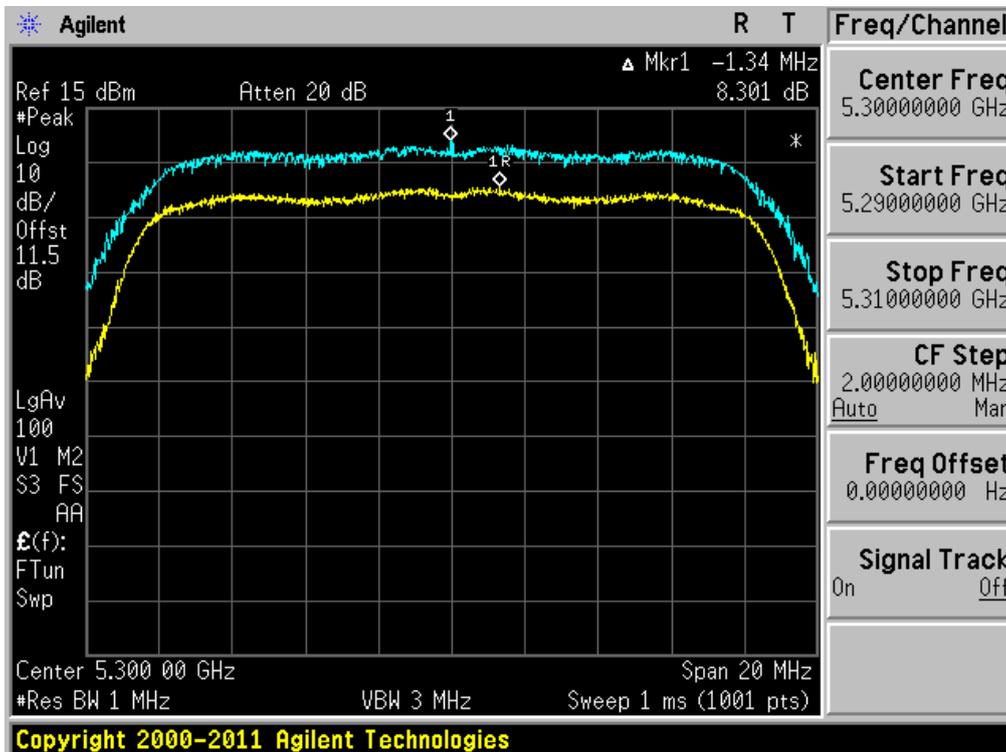**Peak Excursion Ratio**   Test Mode: 802.11n HT20   &   Ch.100
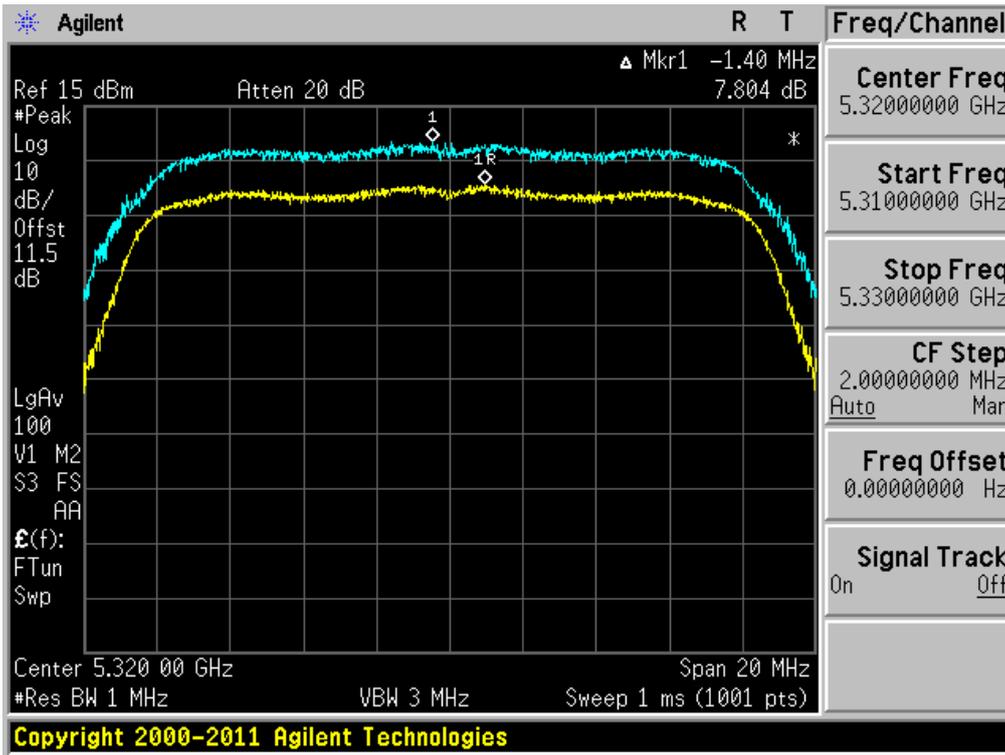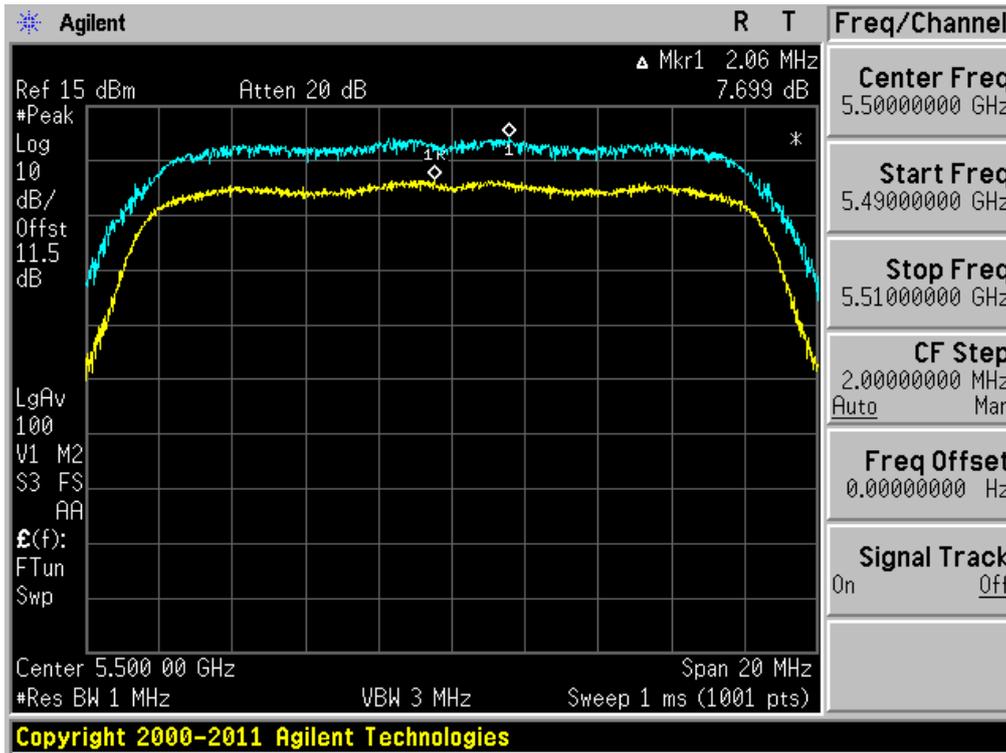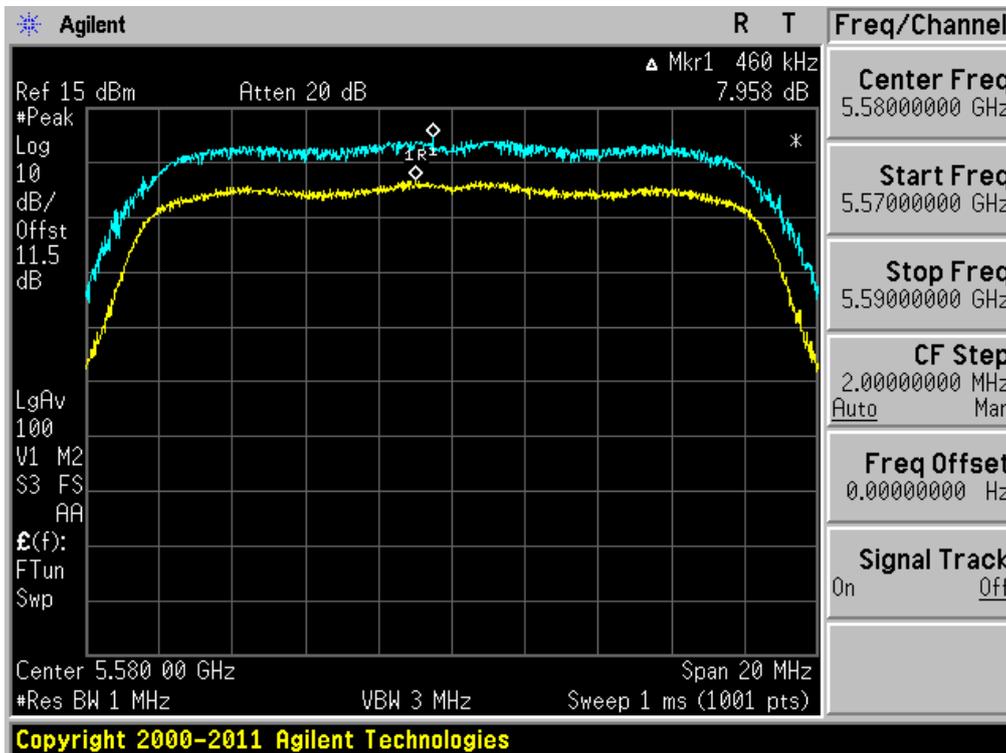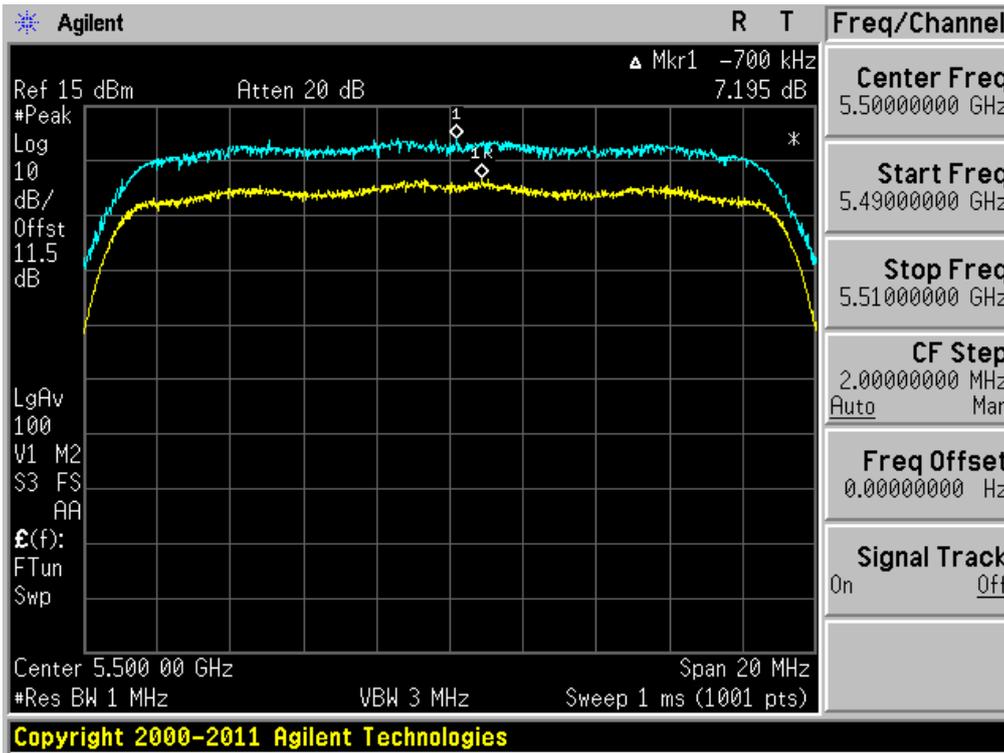

Peak Excursion Ratio   Test Mode: 802.11n HT20   &   Ch.116

Peak Excursion Ratio   Test Mode: 802.11n HT20   &   Ch.140

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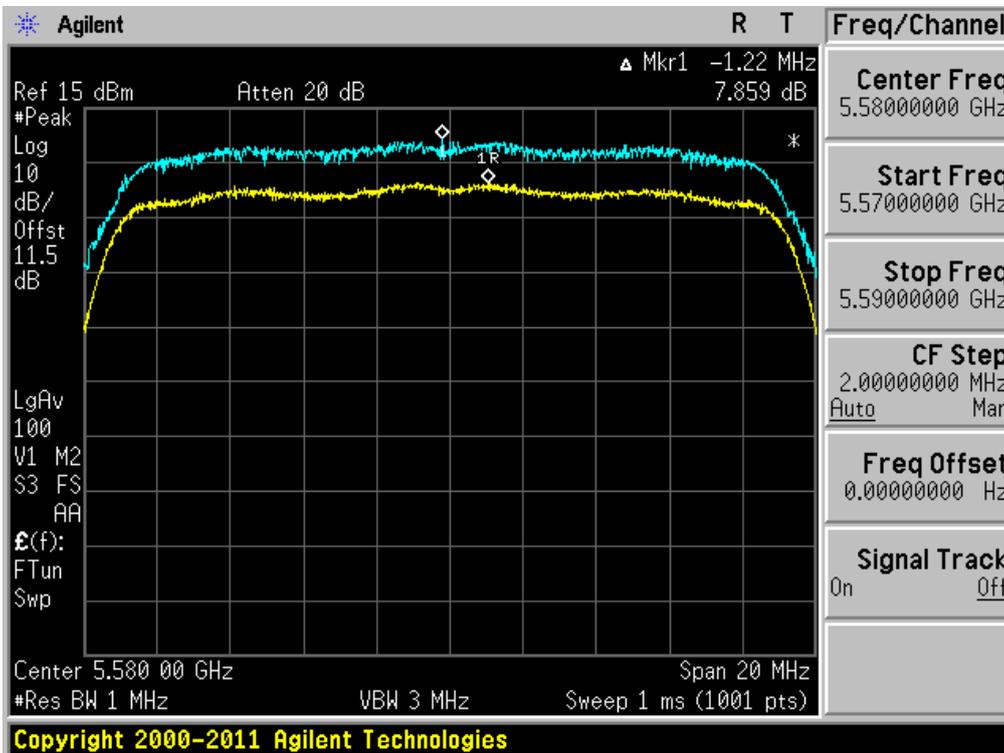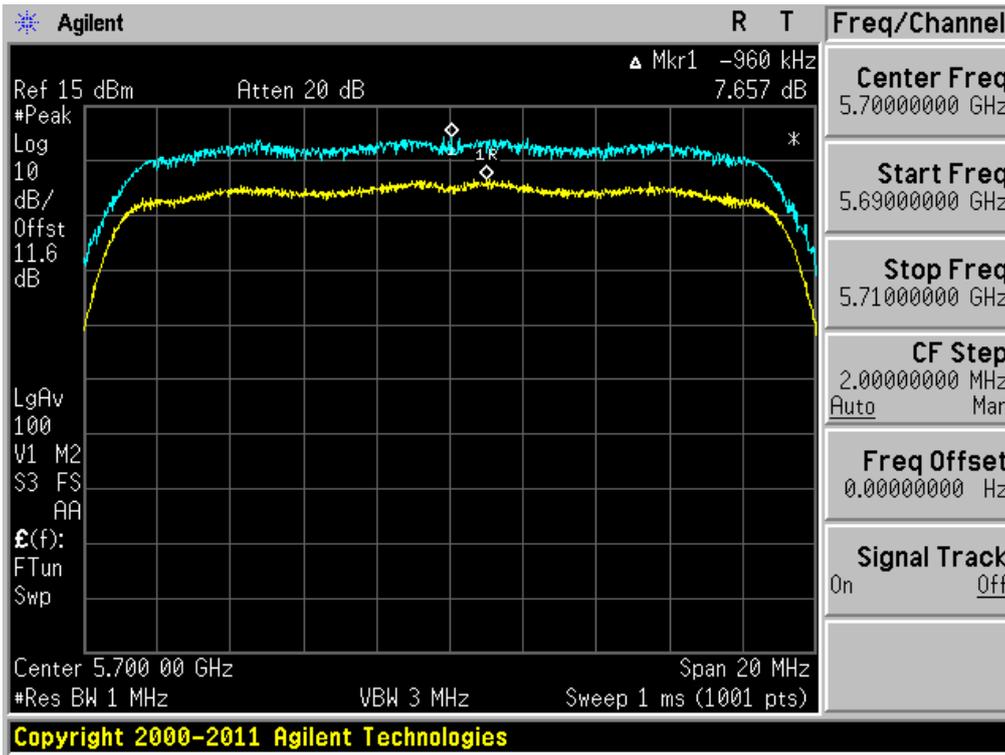
3.2.5 Frequency Stability

Test requirements

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

◼ **TEST PROCEDURE**

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30℃ and +50℃. The temperature was incremented by 10℃ intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

◼ **TEST RESULT : Comply**

- Measurement Data:

OPERATING FREQUENCY : _____5,200,000,000_____ Hz
CHANNEL : _____40_____
REFERENCE VOLTAGE : _____3.800_____ V DC

VOLTAGE (%)	POWER (V DC)	TEMP (℃)	FREQ (Hz)	Deviation (%)
100%		+25(Ref)	5,200,003,569	0.000069
100%		-30	5,200,035,018	0.000673
100%		-20	5,200,030,096	0.000579
100%		-10	5,200,019,365	0.000372
100%		0	5,200,013,658	0.000263
100%	3.800	+10	5,200,007,986	0.000154
100%		+20	5,200,004,742	0.000091
100%		+30	5,200,002,160	0.000042
100%		+40	5,199,999,638	-0.000007
100%		+50	5,199,997,122	-0.000055
100%		+60	5,199,993,020	-0.000134
85%	3.230	+25	5,200,002,425	0.000047
115%	4.370	+25	5,200,000,920	0.000018
BATT.ENDPOINT	3.150	+25	5,200,000,523	0.000010

- Minimum Standard: The emission is maintained within the band of the operation.

- Measurement Data:

OPERATING FREQUENCY : _____5,300,000,000_____ Hz

CHANNEL : _____60_____

REFERENCE VOLTAGE : _____3.800_____ V DC

VOLTAGE (%)	POWER (V DC)	TEMP (℃)	FREQ (Hz)	Deviation (%)
100%		+25(Ref)	5,299,998,633	-0.000026
100%		-30	5,300,034,651	0.000654
100%		-20	5,300,028,618	0.000540
100%		-10	5,300,018,567	0.000350
100%		0	5,300,014,282	0.000269
100%	3.800	+10	5,300,005,408	0.000102
100%		+20	5,300,002,246	0.000042
100%		+30	5,299,999,729	-0.000005
100%		+40	5,299,996,432	-0.000067
100%		+50	5,299,994,646	-0.000101
100%		+60	5,299,993,803	-0.000117
85%	3.230	+25	5,299,998,228	-0.000033
115%	4.370	+25	5,299,997,280	-0.000051
BATT.ENDPOINT	3.150	+25	5,299,997,079	-0.000055

- Minimum Standard: The emission is maintained within the band of the operation.

- Measurement Data:

OPERATING FREQUENCY :   5,580,000,000   Hz

CHANNEL :   116

REFERENCE VOLTAGE :   3.800   V DC

VOLTAGE (%)	POWER (V DC)	TEMP (℃)	FREQ (Hz)	Deviation (%)
100%		+25(Ref)	5,579,999,246	-0.000014
100%		-30	5,580,033,284	0.000596
100%		-20	5,580,028,123	0.000504
100%		-10	5,580,019,687	0.000353
100%		0	5,580,015,340	0.000275
100%	3.800	+10	5,580,004,143	0.000074
100%		+20	5,580,003,138	0.000056
100%		+30	5,579,999,831	-0.000003
100%		+40	5,579,995,319	-0.000084
100%		+50	5,579,994,425	-0.000100
100%		+60	5,579,992,069	-0.000142
85%	3.230	+25	5,579,999,102	-0.000016
115%	4.370	+25	5,579,996,894	-0.000056
BATT.ENDPOINT	3.150	+25	5,579,998,986	-0.000018

- Minimum Standard: The emission is maintained within the band of the operation.

3.2.6 Radiated Spurious Emission Measurements

■ **TEST PROCEDURE**

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure.   An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in semi anechoic chamber. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine the worst-case orientation for maximum emissions.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033**

● **Measurements Below 1000MHz**
  a) Follow the requirements in section G)3), "General Requirements for Unwanted Emissions Measurements"
  b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however,
    peak detection is permitted as an alternative to quasi-peak detection.

  G)3), General Requirements for Unwanted Emissions Measurements. The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:
  a) EUT Duty Cycle
  (1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
  (2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:
    • The EUT shall be configured to operate at the maximum achievable duty cycle.
    • Measure the duty cycle, x, of the transmitter output signal.
    • Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
    • The test report shall include the following additional information:
      ◦ The reason for the duty cycle limitation.
      ◦ The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
      ◦ The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.
  (3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

● **Measurements Above 1000MHz (Peak)**
  a) Follow the requirements in section G)3), "General Requirements for Unwanted Emissions Measurements".
  b) Peak emission levels are measured by setting the analyzer as follows:
    (1) **RBW = 1 MHz**.
    (2) **VBW ≥ 3 MHz**.
    (3) **Detector = Peak.**
    (4) Sweep time = auto.
    (5) Trace mode = max hold.
    (6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

● **Measurements Above 1000MHz (Method AD)**
    (1) **RBW = 1 MHz.**
    (2) **VBW ≥ 3 MHz.**
    (3) **Detector = RMS**, if span/(# of points in sweep) ≤ RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
    (4) Averaging type = power (i.e., RMS)
      • As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
    (5) Sweep time = auto.
    (6) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces should be averaged.
    (7) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
      • If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
      • **If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log(1/x), where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.

◉ **Minimum Standard:**

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz.   However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240			
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

▪ **FCC Part 15.407 (b):** Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the **5.15-5.25 GHz band**: all emissions outside of the
   5.15-5.35 GHz band shall not exceed an **EIRP of -27 dBm/MHz**.
(2) For transmitters operating in the **5.25-5.35 GHz band**: all emissions outside of the
   5.15-5.35 GHz band shall not exceed an **EIRP of -27 dBm/MHz**. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
(3) For transmitters operating in the **5.47-5.725 GHz band**: all emissions outside of the
   5.47-5.725 GHz band shall not exceed an **EIRP of -27 dBm/MHz.**
(4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
(5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.

◼ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11a　&　5180MHz(Ch. 36)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5148.200	H	X	PK	50.94	3.08	-	-	54.02	74.00	19.98
5146.400	H	X	AV	35.23	3.08	0.46	-	38.76	54.00	15.23
10361.720	H	Z	PK	47.55	11.39	-	-6.02	52.92	68.20	15.28

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11a　&　5200MHz(Ch. 40)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10403.970	H	Z	PK	47.35	11.98	-	-6.02	53.31	68.20	14.89
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11a　&　5240MHz(Ch. 48)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10481.700	H	Z	PK	46.34	12.36	-	-6.02	52.68	68.20	15.52
-	-	-	-	-	-	-	-	-	-	-

Note.
1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
    Margin = Limit – Result
    Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
    T.F = AF + CL – AG
    DUTY Correction Factor : 0.46 dB = 20*log(1/0.95) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

◉ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: _**802.11a & 5260MHz(Ch. 52)**_

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10521.820	H	Z	PK	48.3	12.08	-	-6.02	54.36	68.20	13.84
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: _**802.11a & 5280MHz(Ch. 56)**_

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10600.900	H	Z	PK	47.81	12.21	-	-6.02	54.00	74.00	20.00
10600.050	H	Z	AV	38.34	12.21	0.46	-6.02	44.99	54.00	9.01

30MHz ~ 40GHz Radiated Spurious Emissions: _**802.11a & 5320MHz(Ch. 64)**_

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5350.300	H	X	PK	53.72	3.61	-	-	57.33	74.00	16.67
5351.300	H	X	AV	36.49	3.61	0.46	-	40.56	54.00	13.44
10637.150	H	Z	PK	48.73	12.53	-	-6.02	55.24	74.00	18.76
10636.900	H	Z	AV	38.37	12.53	0.46	-6.02	45.34	54.00	8.66

Note.
1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
    Margin = Limit – Result
    Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
    T.F = AF + CL – AG
    DUTY Correction Factor : 0.46 dB = 20*log(1/0.95) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m.   So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

◼ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11a &   5500MHz(Ch. 100)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5467.720	H	Z	PK	54.46	3.4	-	-	57.86	68.20	10.34
11001.700	H	Z	PK	49.48	12.92	-	-6.02	56.38	74.00	17.62
10998.550	H	Z	AV	39.9	12.92	0.46	-6.02	47.26	54.00	6.74

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11a &   5580MHz(Ch. 116)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11159.870	H	Z	PK	49.84	14.65	-	-6.02	58.47	74.00	15.53
11160.090	H	Z	AV	39.78	14.65	0.46	-6.02	48.87	54.00	5.13

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11a &   5700MHz(Ch. 140)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5726.270	H	Z	PK	57.18	3.8	-	-	60.98	68.20	7.22
11400.450	H	Z	PK	50.12	14.65	-	-6.02	58.75	74.00	15.25
11401.800	H	Z	AV	40.41	14.65	0.46	-6.02	49.50	54.00	4.50

Note.
1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
    Margin = Limit – Result
    Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
    T.F = AF + CL – AG
    DUTY Correction Factor : 0.46 dB = 20*log(1/0.95) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m.   So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

◪ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: _802.11n HT20 & 5180MHz(Ch. 36)_

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5139.150	H	X	PK	50.59	3.08	-	-	53.67	74.00	20.33
5146.220	H	X	AV	35.22	3.08	0.46	-	38.76	54.00	15.24
10364.540	H	Z	PK	47.13	11.39	-	-6.02	52.50	68.20	15.70

30MHz ~ 40GHz Radiated Spurious Emissions: _802.11n HT20 & 5200MHz(Ch. 40)_

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10399.450	H	Z	PK	48.27	11.98	-	-6.02	54.23	68.20	13.97
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: _802.11n HT20 & 5240MHz(Ch. 48)_

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10477.440	H	Z	PK	46.71	11.98	-	-6.02	52.67	68.20	15.53
-	-	-	-	-	-	-	-	-	-	-

Note.
1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
   Margin = Limit – Result
   Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
   T.F = AF + CL – AG
   DUTY Correction Factor : 0.46 dB = 20*log(1/0.95) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m.   So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

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◉ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11n HT20 & 5260MHz(Ch. 52)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10519.990	H	Z	PK	48.87	12.08	-	-6.02	54.93	68.20	13.27
-	-	-	-	-	-	-	-	-	-	-

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11n HT20 & 5280MHz(Ch. 56)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10603.200	H	Z	PK	49.14	12.21	-	-6.02	55.33	74.00	18.67
10600.650	H	Z	AV	38.18	12.21	0.46	-6.02	44.83	54.00	9.17

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11n HT20 & 5320MHz(Ch. 64)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5350.200	H	X	PK	54.55	3.61	-	-	58.16	74.00	15.84
5350.450	H	X	AV	37.69	3.61	0.46	-	41.76	54.00	12.24
10645.250	H	Z	PK	48.63	12.53	-	-6.02	55.14	74.00	18.86
10637.300	H	Z	AV	38.54	12.53	0.46	-6.02	45.51	54.00	8.49

Note.
1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
   Margin = Limit – Result
   Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
   T.F = AF + CL – AG
   DUTY Correction Factor : 0.46 dB = 20*log(1/0.95) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m. So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

◾ **Measurement Data:**

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11n HT20 & 5500MHz(Ch. 100)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5469.880	H	Z	PK	54.69	3.4	-	-	58.09	68.20	10.11
11002.550	H	Z	PK	48.77	12.92	-	-6.02	55.67	74.00	18.33
11002.000	H	Z	AV	39.62	12.92	0.46	-6.02	46.98	54.00	7.02

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11n HT20 & 5580MHz(Ch. 116)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
11159.700	H	Z	PK	49.23	14.65	-	-6.02	57.86	74.00	16.14
11159.300	H	Z	AV	40.28	14.65	0.46	-6.02	49.37	54.00	4.63

30MHz ~ 40GHz Radiated Spurious Emissions: *802.11n HT20 & 5700MHz(Ch. 140)*

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector	Reading (dBuV)	T.F (dB/m)	DUTY Correction Factor (dB)	Distance Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5726.500	H	Z	PK	57.85	3.8	-	-	61.65	68.20	6.55
11403.800	H	Z	PK	49.34	14.65	-	-6.02	57.97	74.00	16.03
11406.150	H	Z	AV	40.24	14.65	0.46	-6.02	49.33	54.00	4.67

Note.
1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
    Margin = Limit – Result
    Result = Reading + T.F + DUTY Correction Factor + Distance Correction Factor
    T.F = AF + CL – AG
    DUTY Correction Factor : 0.46 dB = 20*log(1/0.95) for Method AD.
3. Measurement Distance above 10 GHz = 1.5 m.   So Distance Correction Factor : -6.02dB = 20*log(1.5m/3m)

3.2.7 AC Conducted Emissions

◼ **TEST PROCEDURE :**
The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold.   Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz.   The emissions are maximized further by cable manipulation and Exerciser operation.   The highest emissions relative to the limit are listed.

◼ **Measurement Data: Comply**
Note 1: See next pages for actual measured spectrum plots and data.

◼ **Minimum Standard: FCC Part 15.207(a)/EN 55022**

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

AC Line Conducted Emissions (Graph)

Test Mode: 802.11a_5.1G

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AC Line Conducted Emissions (Data List)

Test Mode: 802.11a_5.1G

Results of Conducted Emission

Digital EMC
Date : 2012-07-26

Model No.	:	LG-P768g
Type	:	
Serial No.	:	Identical prototype
Test Condition	:	WLAN
Memo	:	5.1GHz

Refference No.	:	
Power Supply	:	120 V 60 Hz
Temp/Humi.	:	25 'C 45 % R.H.
Operator	:	S.K.RYU

LIMIT : CISPR22_B QP
        CISPR22_B AV

NO	FREQ [MHz]	READING QP [dBuV]	AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	AV [dBuV]	LIMIT QP [dBuV]	AV [dBuV]	MARGIN QP [dBuV]	AV [dBuV]	PHASE
1	0.30269	37.2	25.0	0.2	37.4	25.2	60.2	50.2	22.8	25.0	N
2	0.34938	35.7	23.6	0.3	36.0	23.9	59.0	49.0	23.0	25.1	N
3	0.38339	34.2	24.0	0.3	34.5	24.3	58.2	48.2	23.7	23.9	N
4	0.48374	33.5	20.1	0.2	33.7	20.3	56.3	46.3	22.6	26.0	N
5	0.53216	32.0	15.8	0.2	32.2	16.0	56.0	46.0	23.8	30.0	N
6	0.66201	28.9	14.7	0.2	29.1	14.9	56.0	46.0	26.9	31.1	N
7	4.34450	25.9	14.1	0.4	26.3	14.5	56.0	46.0	29.7	31.5	N
8	25.76700	23.2	11.5	1.3	24.5	12.8	60.0	50.0	35.5	37.2	N
9	0.30250	36.4	31.0	0.2	36.6	31.2	60.2	50.2	23.6	19.0	L1
10	0.35084	37.6	32.8	0.3	37.9	33.1	58.9	48.9	21.0	15.8	L1
11	0.39876	33.1	25.0	0.3	33.4	25.3	57.9	47.9	24.5	22.6	L1
12	0.43569	32.0	22.7	0.2	32.2	22.9	57.1	47.1	24.9	24.2	L1
13	0.57164	30.4	23.5	0.2	30.6	23.7	56.0	46.0	25.4	22.3	L1
14	1.45000	29.2	21.0	0.3	29.5	21.3	56.0	46.0	26.5	24.7	L1
15	6.48850	26.8	18.3	0.5	27.3	18.8	60.0	50.0	32.7	31.2	L1
16	12.86250	24.4	13.8	0.9	25.3	14.7	60.0	50.0	34.7	35.3	L1

AC Line Conducted Emissions (Graph)

Test Mode: 802.11a_5.3G

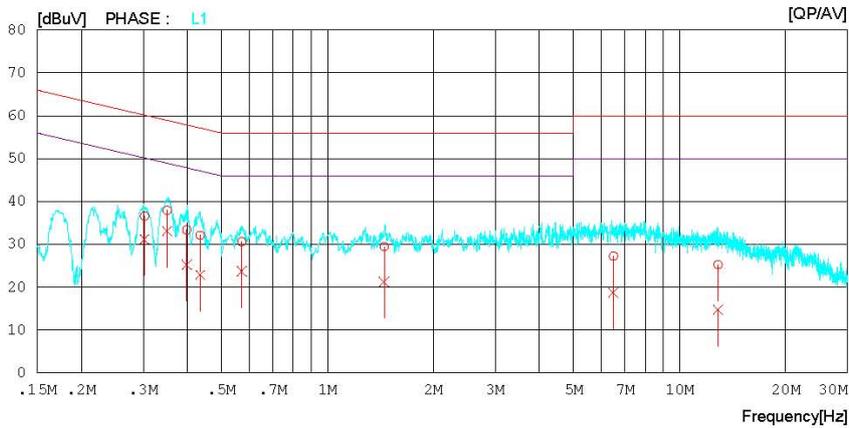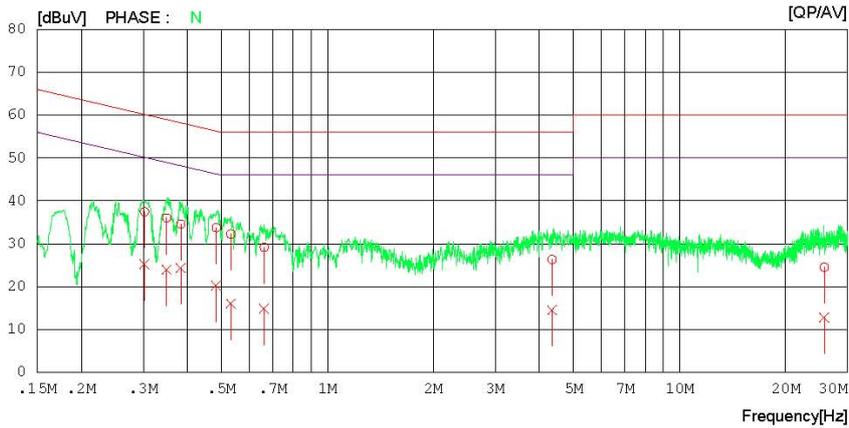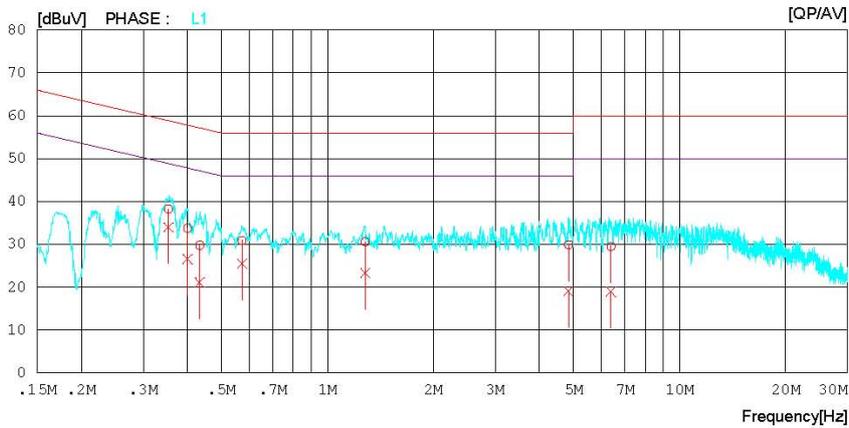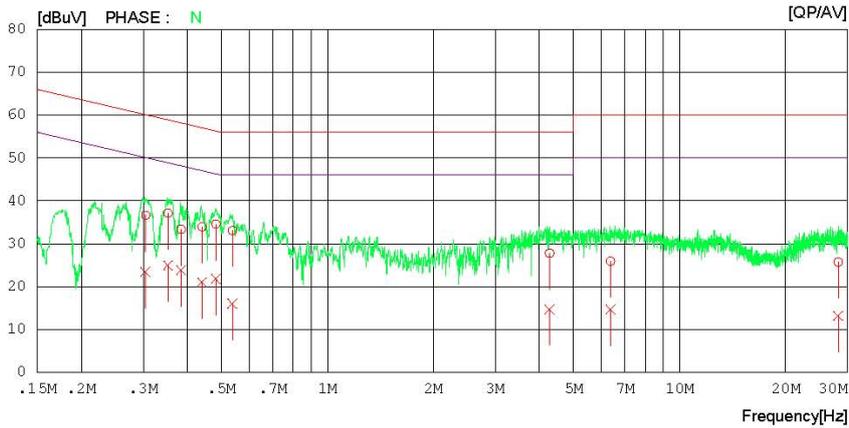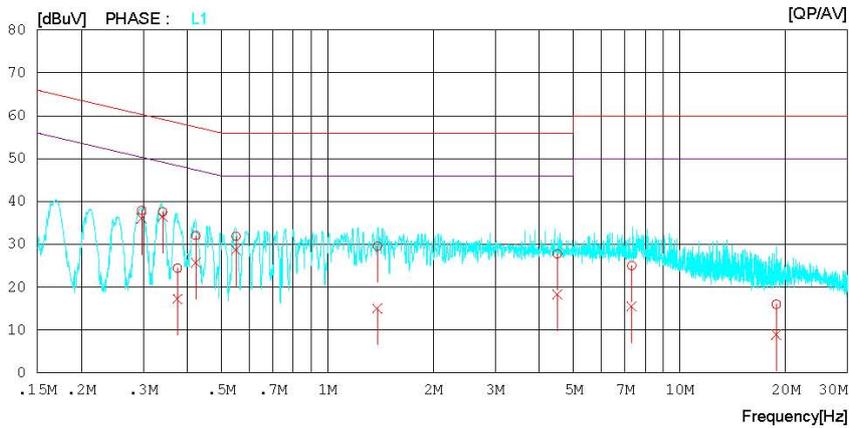## AC Line Conducted Emissions (Data List)

Test Mode: 802.11a_5.3G

Results of Conducted Emission

Digital EMC
Date : 2012-07-26

Model No.	:	LG-P768g	Refference No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	25 'C 45 % R.H.
Test Condition	:	WLAN	Operator	:	S.K.RYU
Memo	:	5.3GHz			

LIMIT : CISPR22_B QP
CISPR22_B AV

NO	FREQ [MHz]	READING QP [dBuV]	AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	AV [dBuV]	LIMIT QP [dBuV]	AV [dBuV]	MARGIN QP [dBuV]	AV [dBuV]	PHASE
1	0.30469	36.4	23.2	0.2	36.6	23.4	60.1	50.1	23.5	26.7	N
2	0.35275	36.8	24.6	0.3	37.1	24.9	58.9	48.9	21.8	24.0	N
3	0.38451	33.1	23.5	0.3	33.4	23.8	58.2	48.2	24.8	24.4	N
4	0.44104	33.7	20.7	0.2	33.9	20.9	57.0	47.0	23.1	26.1	N
5	0.48274	34.4	21.6	0.2	34.6	21.8	56.3	46.3	21.7	24.5	N
6	0.53719	32.9	15.8	0.2	33.1	16.0	56.0	46.0	22.9	30.0	N
7	4.27600	27.4	14.3	0.4	27.8	14.7	56.0	46.0	28.2	31.3	N
8	6.37000	25.4	14.1	0.5	25.9	14.6	60.0	50.0	34.1	35.4	N
9	28.23850	24.4	11.9	1.3	25.7	13.2	60.0	50.0	34.3	36.8	N
10	0.35356	38.0	33.7	0.3	38.3	34.0	58.9	48.9	20.6	14.9	L1
11	0.40096	33.5	26.3	0.3	33.8	26.6	57.8	47.8	24.0	21.2	L1
12	0.43430	29.6	20.9	0.2	29.8	21.1	57.2	47.2	27.4	26.1	L1
13	0.57244	30.7	25.3	0.2	30.9	25.5	56.0	46.0	25.1	20.5	L1
14	1.28000	30.3	23.0	0.3	30.6	23.3	56.0	46.0	25.4	22.7	L1
15	4.84300	29.5	18.7	0.4	29.9	19.1	56.0	46.0	26.1	26.9	L1
16	6.38900	29.0	18.5	0.5	29.5	19.0	60.0	50.0	30.5	31.0	L1

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AC Line Conducted Emissions (Graph)

Test Mode: 802.11a_5.5G

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AC Line Conducted Emissions (Data List)

Test Mode: 802.11a_5.5G

Results of Conducted Emission

Digital EMC
Date : 2012-08-09

Model No.	:	LG-P768g
Type	:	
Serial No.	:	Identical prototype
Test Condition	:	WLAN

Refference No.	:	
Power Supply	:	120 V 60 Hz
Temp/Humi.	:	25 'C 45 % R.H.
Operator	:	S.K.RYU

Memo   :   5.5GHz

LIMIT : CISPR22_B QP
　　　　 CISPR22_B AV

NO	FREQ [MHz]	READING QP [dBuV]	AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	AV [dBuV]	LIMIT QP [dBuV]	AV [dBuV]	MARGIN QP [dBuV]	AV [dBuV]	PHASE
1	0.29630	39.1	29.6	0.2	39.3	29.8	60.3	50.3	21.0	20.5	N
2	0.37650	33.2	24.7	0.3	33.5	25.0	58.4	48.4	24.9	23.4	N
3	0.46548	33.9	26.5	0.2	34.1	26.7	56.6	46.6	22.5	19.9	N
4	0.50749	33.8	26.8	0.2	34.0	27.0	56.0	46.0	22.0	19.0	N
5	1.35100	32.6	20.5	0.3	32.9	20.8	56.0	46.0	23.1	25.2	N
6	1.35350	31.8	22.0	0.3	32.1	22.3	56.0	46.0	23.9	23.7	N
7	2.15450	29.9	16.3	0.3	30.2	16.6	56.0	46.0	25.8	29.4	N
8	8.69500	28.8	18.7	0.7	29.5	19.4	60.0	50.0	30.5	30.6	N
9	26.10800	23.0	12.5	1.3	24.3	13.8	60.0	50.0	35.7	36.2	N
10	0.29690	37.8	35.9	0.2	38.0	36.1	60.3	50.3	22.3	14.2	L1
11	0.34050	37.3	36.2	0.3	37.6	36.5	59.2	49.2	21.6	12.7	L1
12	0.37528	24.2	17.0	0.3	24.5	17.3	58.4	48.4	33.9	31.1	L1
13	0.42345	31.7	25.4	0.3	32.0	25.7	57.4	47.4	25.4	21.7	L1
14	0.55039	31.7	28.5	0.2	31.9	28.7	56.0	46.0	24.1	17.3	L1
15	1.38800	29.3	14.7	0.3	29.6	15.0	56.0	46.0	26.4	31.0	L1
16	4.50100	27.4	17.9	0.4	27.8	18.3	56.0	46.0	28.2	27.7	L1
17	7.32000	24.5	15.1	0.5	25.0	15.6	60.0	50.0	35.0	34.4	L1
18	18.81500	14.8	7.8	1.2	16.0	9.0	60.0	50.0	44.0	41.0	L1

3.2.8 Antenna Requirements

◾ **Procedure:**

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

◾ **Conclusion: Comply**

The internal antenna is attached on the main PCB using the special spring tension. (Refer to Internal Photo file.)

◾ **Minimum Standard:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

3.2.9 Occupied Bandwidth

◙ **TEST Requirements**
When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth
to be reported is to be its 99% emission bandwidth, as calculated or measured

◙ **TEST CONFIGURATION**

◙ **TEST PROCEDURE :**
The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%.
The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted.
Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth
than actual

◙ **TEST RESULT : N/A**

Minimum Standard : N/A

◙ **RESULT PLOT : N/A**

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	E4440A	11/09/30	12/09/30	MY45304199
Spectrum Analyzer	Rohde Schwarz	FSQ26	12/01/09	13/01/09	200445
Harmonic Mixer	OML	M28HWD	12/02/06	13/02/06	Ka100224-1
Digital Multimeter	H.P	34401A	12/03/05	13/03/05	3146A13475, US36122178
Spectrum Analyzer	Agilent	N9020A	12/01/09	13/01/09	MY49100833
Signal Generator	Rohde Schwarz	SMR20	12/03/05	13/03/05	101251
Vector Signal Generator	Rohde Schwarz	SMJ100A	12/01/09	13/01/09	100148
Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-2
DC Power Supply	HP	6622A	12/03/05	13/03/05	3448A03760
High-Pass Filter	Wainwright	WHKX8.5	11/09/19	12/09/19	1
BILOG ANTENNA	SCHAFFNER	CBL6112D	10/12/21	12/12/21	2737
HORN ANT	ETS	3115	12/02/20	13/02/20	6419
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
Attenuator (10dB)	WEINSCHEL	86-10-11	11/09/30	12/09/30	408
Amplifier (22dB)	H.P	8447E	12/01/09	13/01/09	2945A02865
Amplifier (30dB)	Agilent	8449B	12/03/05	13/03/05	3008A01590
EMI TEST RECEIVER	R&S	ESU	12/03/05	13/03/05	100014
EMI TEST RECEIVER	R&S	ESCI	12/03/06	13/03/06	100364
CVCF	KIKUSUI	PCR1000L	11/09/15	12/09/15	14110610
LISN	R&S	ESH2-Z5	11/09/30	12/09/30	8287391006
RFI/Field intensity Meter	KYORITSU	KNM-2402	12/07/02	13/07/02	4N-170-3
TEMP & HUMIDITY Chamber	SJ SCIENCE	TEMI850-10	12/03/06	13/03/06	S7400LE267 1226

APPENDIX I
Conducted Test set up Diagram & Path loss Information

▪ **Conducted Measurement**
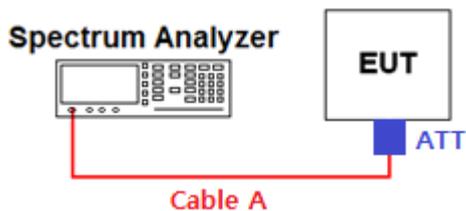
Path loss value information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
5.180	11.23	5.320	11.49
5.520	11.30	5.500	11.50
5.240	11.34	5.580	11.48
5.260	11.42	5.700	11.55
5.300	11.46		

Note. 1: The path loss from EUT to Spectrum analyzer was measured and used for test.
Path loss (=S/A's offset value) = Cable A + ATT (Attenuator, Applied only when it was used externally)

APPENDIX II
Duty cycle plots

▣ **TEST PROCEDURE**

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW.
4. Set detector = peak.
5. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are > 50/T**, where T is defined in section B)1)a), and **the number of sweep points across duration T exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)
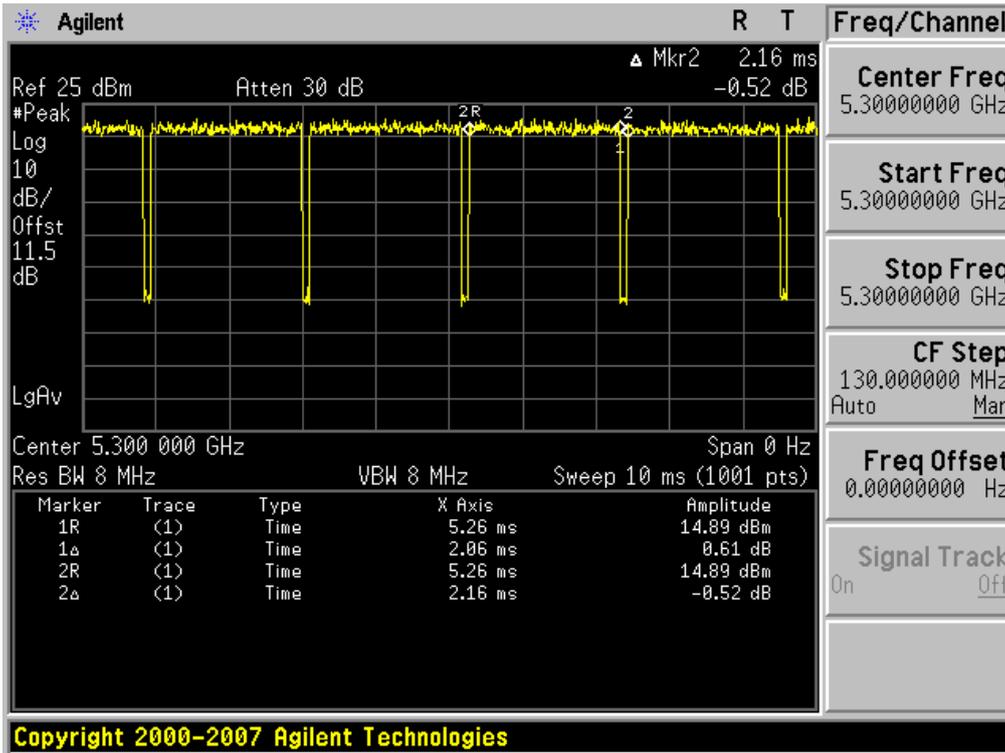
Duty Cycle   Test Mode: 802.11a   &   Ch.40
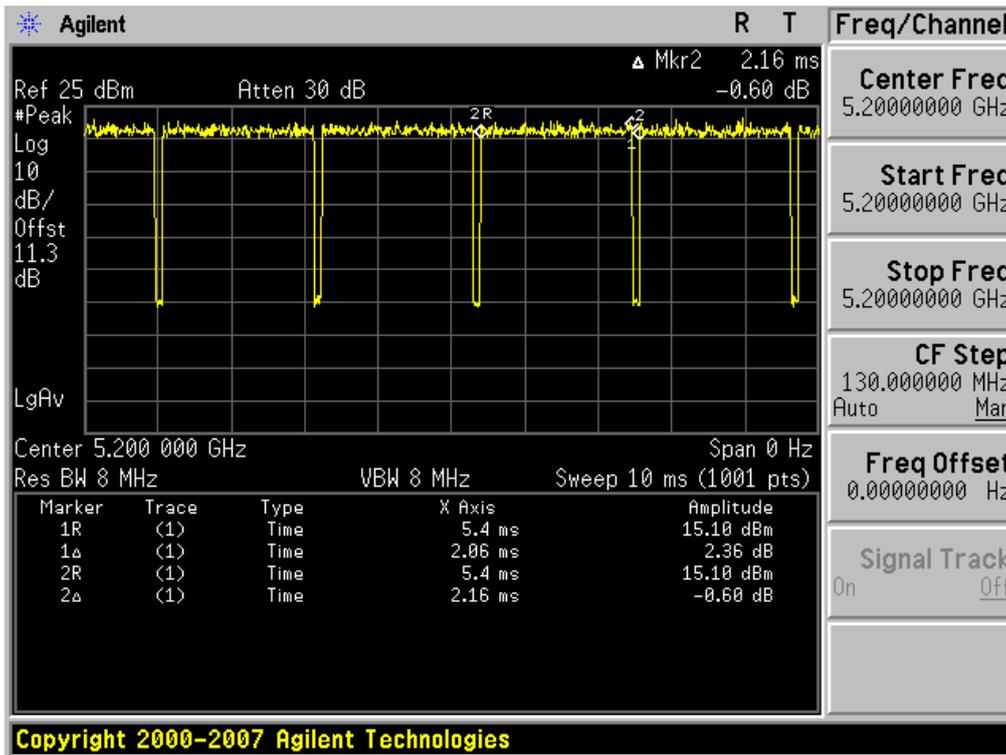
Duty Cycle　　　　　　　　　　　　　Test Mode: 802.11a　&　Ch.60
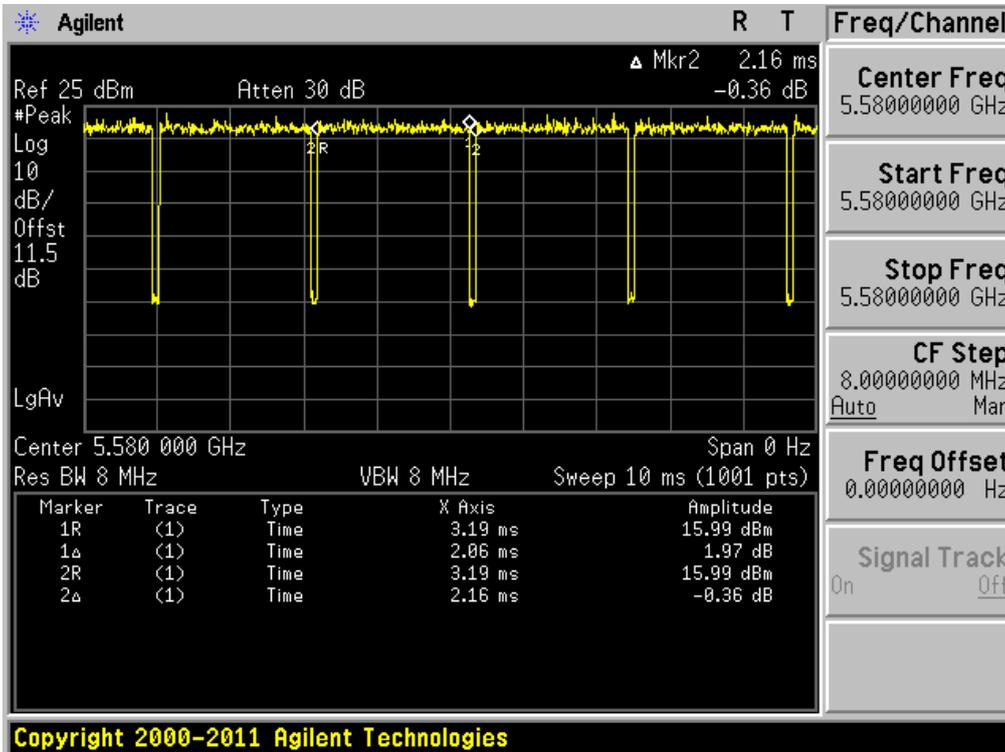

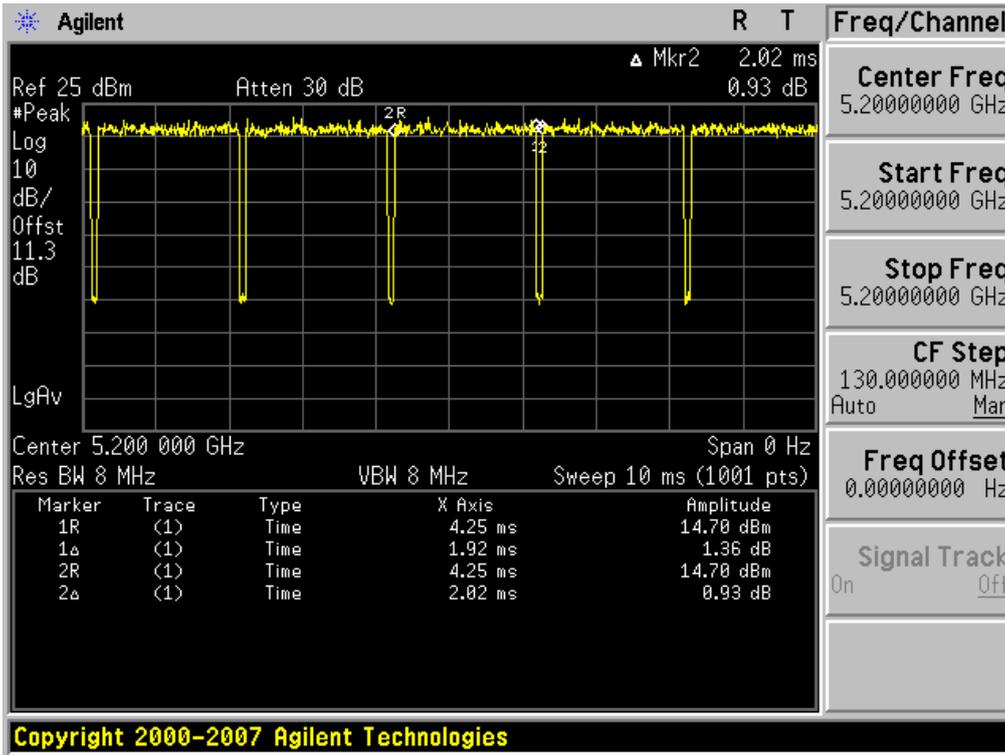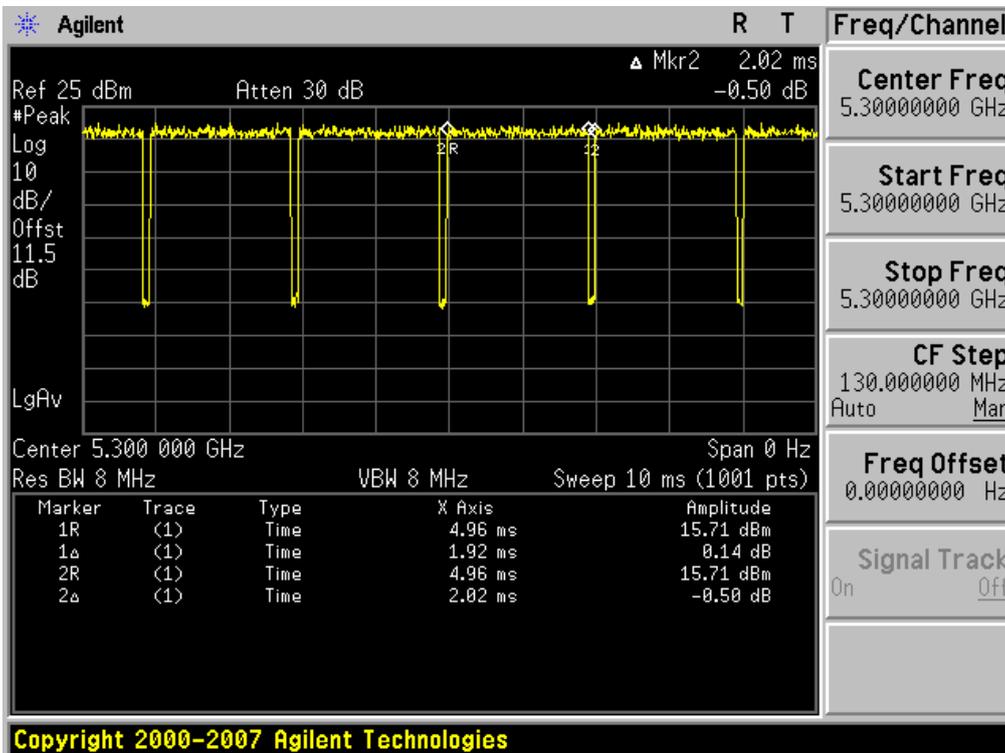**Duty Cycle**　　　　　　　　　　　　　Test Mode: 802.11a　&　Ch.116

Duty Cycle   Test Mode: 802.11n(HT20) & Ch.40

Duty Cycle   Test Mode: 802.11n(HT20) & Ch.60

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Duty Cycle   Test Mode: 802.11n(HT20)   &   Ch.116

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